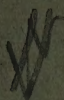


BABIES

A BOOK FOR MATERNITY NURSES



BY

MARGARET FRENCH

MACMILLAN AND CO., LIMITED
ST. MARTIN'S STREET, LONDON



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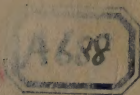
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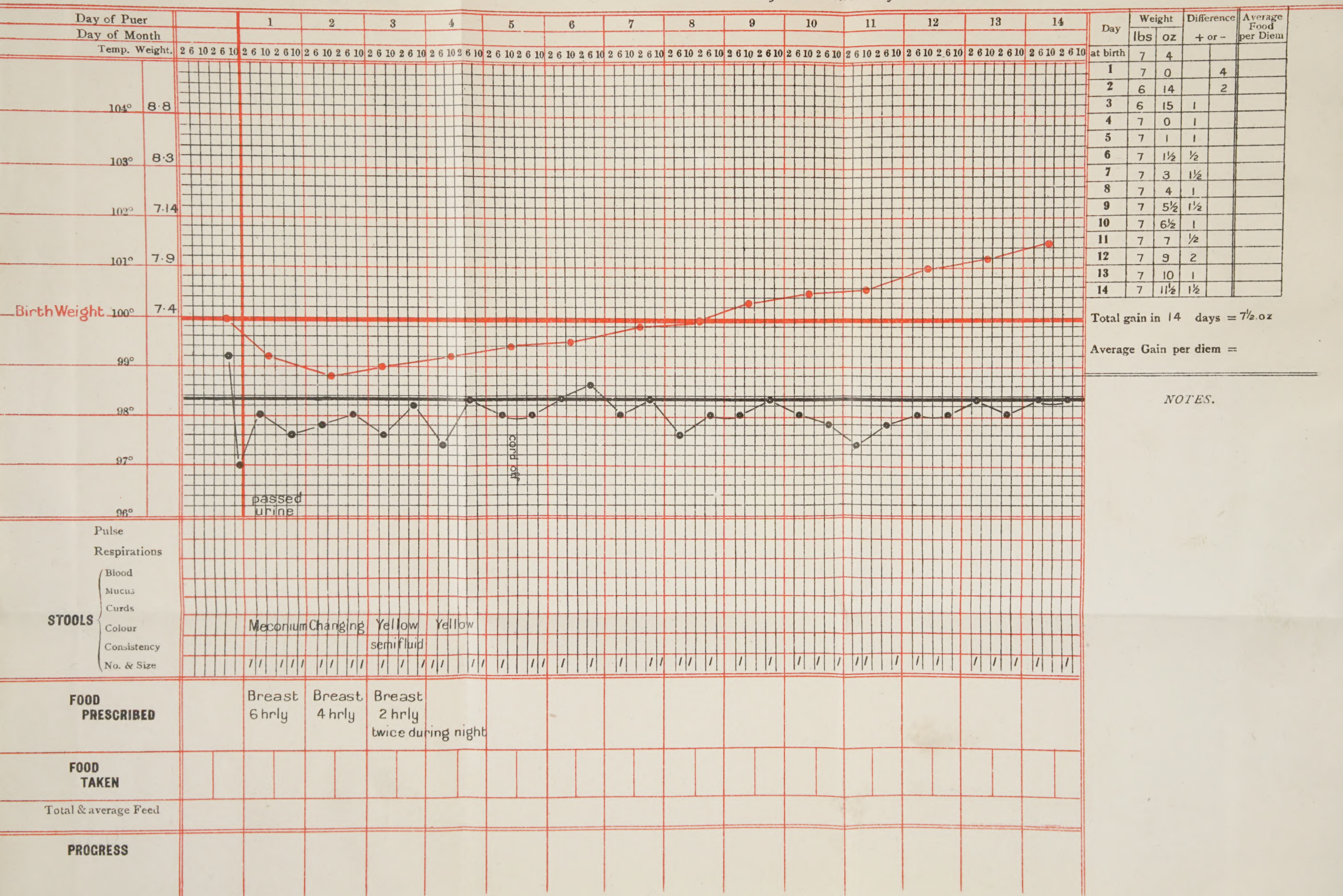
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BABIES

A BOOK FOR MATERNITY NURSES

697
~~C. H.~~

BY

MARGARET FRENCH

SISTER AT THE GENERAL LYING-IN HOSPITAL, YORK ROAD, LAMBETH

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PREFACE

THIS little book is written in response to the request, so often made to me by the nurses at York Road, to tell them "something about babies." I have tried to tell the things that will interest them, and also some things that are perhaps less interesting, but yet necessary for them to know in the interests of their little patients. There are probably still many points omitted, and I shall be grateful to have such suggested to me, in case the little book is fortunate enough to reach a second edition.

For much of the information in the later part of the book, I am indebted to the reference books of John Thomson, M.D., F.R.C.P., Prof. Dr. Ferdinand Fröhwald, Eric Pritchard, M.A., M.R.C.P., and Edmund Cautley, M.D., F.R.C.P.

The classification of patent foods is that given by several authorities, and founded, I believe, upon the analyses of Leeds.

The food table is based, in a simple form, upon the scientific calculations of the same authorities.

MARGARET FRENCH.

1913.

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BABIES

A BOOK FOR MATERNITY NURSES

I.

THE PREPARATION.

THE first point to be considered with regard to the well-being of the infant is the importance of securing the most favourable conditions and environment that are possible for it at birth.

For this reason the wise nurse will always arrange to see her patient some time during pregnancy, so that she may give any necessary instructions or advice about the preparations. Very often, too, she will find that she is consulted about little matters of health that the patient would not care to mention to the doctor.

Certainly the most valuable preparation a mother can make for her child's sake is to preserve her own health, so that she may be in the best possible condition to nurse and to care for it when it is born. As a matter of fact, provided she has been accustomed to living a rational and hygienic life, there is little need for her to make any great change in her habits. She must remember that pregnancy is a physiological condition, that she is not ill, and is not, if she obeys the common laws of health, likely to become so. The chief point to bear in mind is that during this time the whole system is doing double

work, providing oxygen, and nourishment, and throwing off waste material for two people, and care must be taken not to cast unnecessary burdens on those organs which are already working somewhat under pressure.

For example—the diet should be sufficient, but digestible. All highly seasoned and indigestible articles, such as new bread, pastry, veal, pork, curries, pickles, re-cooked meat, and strong tea, are better avoided, as well, of course, as anything that is usually found to disagree. It is seldom necessary to increase the amount of food, but plenty of water may with advantage be taken to drink. Alcohol is unnecessary, but if usually taken, may be continued in moderation. No drugs of ANY kind are permissible without a doctor's advice.

Moderate exercise is beneficial, but it must not be taken to excess or in dangerous forms—horse-riding, machining, cycling, prolonged standing and over-reaching are all bad. Fresh air in abundance is essential. The young mother must not shut herself up, but take a daily walk, and continue as far as possible to follow her usual pursuits and interests, at the same time avoiding stuffy rooms, crowded buildings and late hours.

The daily bath may be continued as usual, but it is perhaps better taken warm on going to bed. The dress should be light and loose, and it is comfortable to have some of the garments suspended from the shoulders. Garters must be discarded, corsets if worn at all should be quite easy, and of the pattern which gives support from below upwards. There must be no pressure on the breasts; and if the nipples are at all flat, it is well to draw them out a little each day when bathing, and to dab them with glycerine and borax or lanoline.

Over fatigue must be guarded against, and during the last few months it will be wise to devote an hour or two daily to resting with the feet up on the sofa or bed.

As to the small troubles that arise, they are usually trivial, and easily alleviated. For instance, the occasional morning sickness of the first few months is often

checked by a cup of tea and a piece of bread and butter before rising. Cramp in the legs is eased by raising them on a pillow at night and not wearing garters by day. Constipation must be treated by a careful laxative diet and plenty of fluid, not by strong purges. Neuralgia is generally the result of bad teeth, and early in pregnancy the dentist should be consulted.

Under doubtful circumstances a doctor should always be consulted, whether the ailment is connected with the pregnancy or not. Among the more serious symptoms for which medical advice is necessary are: persistent and excessive vomiting throughout pregnancy, swelling of the hands and feet, difficulty in passing urine, loss of blood. Any of these conditions demand prompt and skilful treatment.

It will be seen that under ordinary circumstances the mother has only to exercise her common-sense and keep her mind cheerfully occupied in order to enjoy a normal and easy pregnancy. The necessary preparations will engage a good deal of her time, and she will be wise to have everything ready by the seventh month.

The following lists include the things usually asked for by modern nurses and are well within the limits of reason.

For the Mother.

One large mackintosh sheet. (Many nurses carry a second one.)

Two absorbent wool sheets.

Three packets of antiseptic sanitary towels.

One pound of absorbent wool.

One packet of boracic lint.

One large slipper bed-pan.

One enema syringe.

Two good-sized enamel basins.

An enamel saucepan and spirit lamp.

Kettle.

Jug mop, for cleaning utensils.

Feeding cup.

Night lights.

Hot-water bottle.

New nail brush.

Plenty of clean bed linen, and one or two old night-gowns.

For the Baby.

Dusting powder. Either talc, or pure starch powder, are the best for this purpose.

Special cord powder. One part starch powder.

One part oxide of zinc.

Half a part of alum.

Small bottle of olive oil.

Small bottle of glycerine and borax.

Boracic crystals or powder. (For lotion.)

Safety pins.

Reel of white cotton and packet of needles.

Large square of flannel for a receiver.

Mackintosh and flannel aprons.

Bath, soap, and soft flannel for washing.

Soft towels.

Bath thermometer.

Small bottle of brandy.

Cot.

Hot-water bottle. (Rubber.)

Baby clothes. (To be described later.)

Antiseptics and sterile ligatures are usually provided by the nurse.

II.

THE NEW BABY.

To the initiated it is difficult, almost impossible, to see the newly-born baby with the eyes of an outsider. To those who have no personal knowledge of tiny babies, or have only seen them more or less on show, they must, I suppose, appear to be dull and uninteresting little things. But to those who are privileged to see them in every-day and all-day intimacy, to tend and care for them, they are a perpetual source of wonder and joy. To me, every new baby is a new miracle. It is so surprisingly complete, so unexpectedly human and full of life. It often starts sucking its thumb as soon as ever it is born, it frowns and pouts like a grown-up person, gurgles when it is pleased, and when bored yawns in an altogether world-weary manner.

In appearance it is a soft dimply thing about twenty inches long and seven pounds in weight. It is pink in colour, has round well-formed limbs and blue-grey eyes. The hair, if it has any, is soft and silky. Directly the child is born it begins to cry, which is an excellent thing, as it clears out the air passages and draws the air into the lungs.

We are told by scientists that during the first few days little babies neither see nor hear, and certainly these learned authorities must be right. Yet the funny little things respond so readily and look at us with such old-fashioned eyes that they almost seem to hint at a wisdom

more profound and subtle than that of the scientists, and make us wonder whether some other finer sense does not take the place of sight and hearing.

The ideal nurse feels all these things, and at the same time she is a capable person with all the modern methods of baby management at her finger tips.

Her first care when the baby is born will be to attend to his eyes. These delicate organs are easily damaged. If dangerous germs should find their way into them, inflammation would quickly follow and the child's eyesight would be seriously threatened. The eyelids must, therefore, directly the head is born and before the eyes are opened, be swabbed with clean rags or sterile wool wrung out of warm boiled water or boracic lotion. This cleansing process must afterwards be repeated daily when the baby is washed.

The doctor may like to ligature and separate the cord himself, but the nurse must be prepared to do it if necessary, and must in any case provide sterile scissors, ligatures, and dressings for the purpose. When separated, the child is wrapped up in his flannel receiver and put in a warm, safe place until the nurse is free to bathe him.

It is not necessary to describe the ceremony of the bath in detail. Every maternity nurse has been well taught in this respect, and will adopt the manner of her training school. She will, of course, examine the child very carefully and methodically, and also weigh him. Special points to be remembered about the toilet are : When dressing the cord, it should be thoroughly dried with clean cotton wool, dusted with special powder, and the end of the cord turned upwards to prevent contact with the soiled napkin. The dressing must be of anti-septic lint or boiled linen, and it is a wise precaution to tie a second ligature. The nurse's hands must be surgically clean.

A separate towel, and sponge or soft flannel, should be kept for the face.

The binder and all clothing should be loose, especially across the chest, so that the little one may not be embarrassed in its breathing.

In adjusting the garments, the sleeves should be drawn forward over the arms, not the arms dragged back to the sleeves.

Baby likes a firm, gentle hand ; he becomes frightened and unhappy if the nurse is nervous.

The toilet being complete, the child may go to his mother for a few minutes, and must then be tucked up in his cot with a well-protected hot-water bottle. He ought to sleep practically the whole of the first twenty-four hours, only needing to be disturbed two or three times to have his napkin changed or to go to the breast.

Nurse must not forget to look several times during the first few hours to be sure that there is no hæmorrhage from the cord. Should this occur, she must remove the dressing and re-tie the ligature.

As a rule the baby wants very little for the first day or two, except warmth and sleep. He will be put to the breast about every six hours until the milk comes in, partly to stimulate the secretion and partly that he may learn to suck before the breasts become hard. If he should be fretful or thirsty, he may also have some sips of warm boiled water, but nothing else unless ordered by the doctor.

The duty of registering the birth falls upon the father or mother, not the doctor or nurse. Failing the parents, the occupier of the house or person present at the birth must register, or they may be called upon to give information later. Registration must be made within forty-two days in England. In Scotland within twenty-one days. The name under which the child is registered may be altered within twelve months upon giving notice to the Registrar.

Notification is quite a separate thing from registration. It is required by the local authorities, in addition

to registration. The medical practitioner, or the midwife who conducts the case, must send a written notice of the birth to the Medical Officer of Health within thirty hours.

III.

THE NORMAL BABY.

BEFORE birth the foetus is nourished by means of the placenta. The oxygen and nourishment which are necessary for life and growth pass from the mother's blood through the placenta and so into the foetal circulation; the waste material produced by foetal metabolism passes into the maternal circulation in the same manner. The placenta therefore, during intra-uterine life, takes the place of the lungs, digestive organs, and excretory organs. It must be understood that there is no direct communication between the foetal and maternal circulations, that these chemical changes take place through the thin membrane which divides the streams of the maternal and foetal blood flowing in the placenta; just as similar changes take place in our lungs between the air cells and the blood-vessels.

The Foetal Lungs, therefore, are not used before birth; they are somewhat undeveloped, and are unexpanded until the child begins to breathe. The child usually takes an inspiration directly it is born, partly because the cold air on its surface stimulates the nervous system, and partly because, as the placental circulation stops, it feels the need of oxygen.

The Respiration at birth is about 40. It decreases gradually—is between 25 and 35 the first year and about 20 by the eighth year. It is increased by excitement or fatigue.

Foetal Circulation. The main differences between foetal and adult circulation are, that in the foetal circulation very little blood goes to the lungs, the greater part passing by a special artery direct from the right ventricle to the aorta; that there is direct communication between the right and left auricles by means of an opening known as the foramen ovale; that most of the purified blood from the placenta passes through the liver and thence to the heart, where it mixes with impure blood from the upper extremities. (See Fig. 1.)

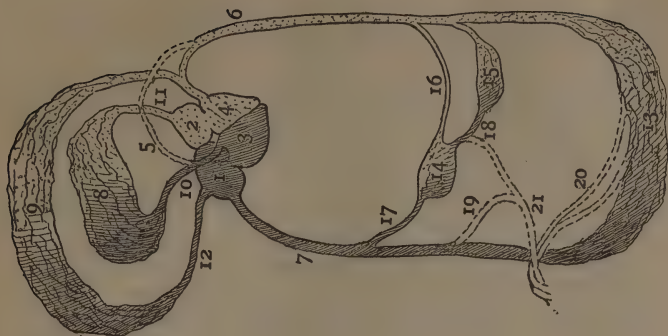
We find, as the result of this circulation, that at birth the walls of the left ventricle are very little thicker than the right, though in the adult they are twice as thick, and that the liver is unduly developed in proportion to the child's size, forming one-thirtieth of the whole body weight.

The change from the foetal to the adult circulation should take place at or soon after birth. The foramen ovale closes, the pulmonary circulation increases, the special artery leading from the right ventricle to the aorta gradually wastes, and the supply of arterial blood to the liver is greatly diminished.

The Pulse Rate at birth ranges from 120 to 160. It is quicker in small and delicate children, and is increased by crying or sitting up. It keeps over 100 the first two years. At the fourth year it is just under 100.

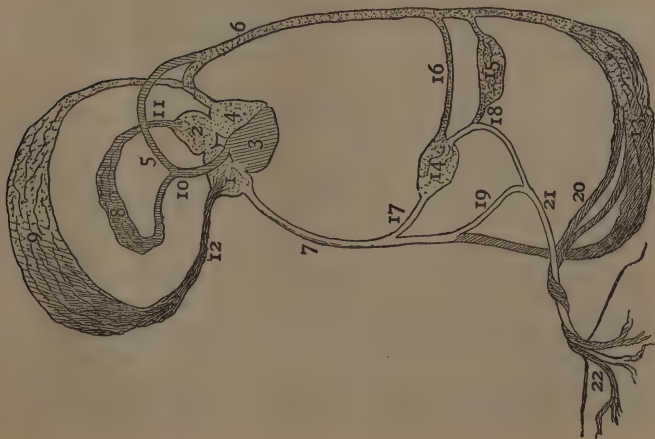
The Temperature at birth is about 99° F. It usually falls for a short time afterwards, but if the child is well cared for should rise again and remain fairly even between 98° and 99° F. There is often a temporary variation between 97° and 100° F., without any very serious cause.

Bones. The child's bones are not fully ossified at birth; they are soft and pliable. The skull bones are thin and not fused together, but separated by divisions known as sutures and fontanelles. This pliability of the skull is essential for the rapid growth of the brain during the first year, and also to allow some compression



CIRCULATION AFTER BIRTH.

1. Right auricle.
2. Left auricle.
3. Right ventricle.
4. Left ventricle.
5. Ductus arteriosus.
6. Aorta.
7. Inferior vena cava.
8. Lungs.
9. Head and upper limbs.
10. Pulmonary artery.
11. Pulmonary vein.
12. Superior vena cava.
13. Lower limbs.
14. Liver.
15. Intestines.
16. Hepatic artery.
17. Hepatic vein.
18. Portal vein.
19. Ductus venosus.
20. Umbilical arteries.
21. Umbilical vein.
22. Placenta.



FETAL CIRCULATION.

of the head during labour. The posterior fontanelle, or space at the back of the head, closes at about two months, and the anterior fontanelle or space in front of the head at about eighteen months.

The Stomach of a newly-born infant is extremely small. Its average capacity is 1 oz. It is capable of great distension, and if over-filled will quickly become permanently over-dilated and weakened. It acts chiefly as a reservoir, in which the digestive processes are started. Food is not absorbed in the stomach.

Weight. The average weight at birth is about 7 lbs.; boys weigh rather more than girls. During the first few days there is a slight loss, and then the weight should begin to rise again and reach the birth level by about the eighth day. The daily increase for the first six months should be 1 oz., or between 5 and 8 oz. a week. Thus, a healthy child doubles its birth weight in five months, and trebles it by the end of the first year.

The daily weighing is one of the most reliable guides as to the child's physical condition; it is, however, not absolutely infallible, as some children gain weight in ill-health. A small steady gain is the most satisfactory; a sudden jump or very rapid rise being nearly always a sign of improper feeding, and followed by an unsatisfactory period.

Length. The child's length is less variable than its weight. The newly-born infant, of full term, nearly always measures 20 inches. If less than 18 in., it is probably premature. During the first few months it grows rapidly, measuring 25 in. at six months and 28 in. at one year.

Management of the New Baby. We have already said that the chief requirements of a newly-born baby are quiet and warmth. The nerves of a young infant are easily excited, and if he is constantly taken up, jumped about, talked to, and shown off, he will soon lose his sweet placid content and become a whining fretful child. In the very early days his most urgent necessity is

perhaps warmth. He has at first little power of creating or maintaining heat for himself, and quickly feels changes in the surrounding atmosphere. At the same time he needs fresh air, and should never have his head smothered up in shawls when asleep. He will be quite content if warmly tucked up in his cot and placed well out of the draught in a room with a fire and an open window. On a warm summer day his cot may be put in a sheltered corner of the garden any time after the first week. Well wrapped up, he may be taken for a short walk as soon as the second or third day in summer, or on a mild day at the end of a week in winter. It is not wise to take him out in very cold weather, or in a high or easterly wind while he is quite tiny.

Sleep. The baby should be accustomed from the beginning to sleep in his cot. It is in every way safer and healthier, and if he has never been used to sleep with his mother he will be quite content. He will, however, need a hot-water bottle for some little time, except in quite hot weather. This may be discontinued as soon as it is found that he can keep warm enough in his blankets without it, but it is a great mistake to try to "harden off" little babies before they have acquired powers of resistance; and it must be remembered that cold is a frequent cause of sleeplessness and indigestion.

For the first few weeks the child will sleep the whole of the time not occupied by feeding or dressing. After the first month he will often lie awake for an hour or more at a time, and if well trained will lie perfectly happy in his cot looking about him and playing with his hands and toes. He should never be put to sleep in the arms, nor should he be rocked. These are bad habits more easily contracted than broken. He should also be trained from the very early days to sleep with his mouth closed, mouth breathing both renders the child liable to colds and favours the growth of adenoids.

Baby's Toilet. The question whether it is wise to immerse the infant in the bath water before the cord is

off has been much discussed. Theoretically it is certainly more sound to keep the cord dry and sterile until it has separated and the scar healed; but in practice babies that are bathed every day appear to do very well, so that with a healthy child I do not think it a very important point.

For the first month or two one bath a day will be quite enough, the child being just "topped and tailed" in the evening; later on he may have two baths, a warm one on going to bed, and in the morning a cool one, gradually reducing the temperature of the latter until at two years old he takes it about 70° F.

Baby's Skin is very tender, and in cold weather it may sometimes be necessary to use a little lanoline in order to prevent chafing of the face, especially with children who regurgitate their food, or dribble a great deal, but in the ordinary way cleanliness and careful drying is quite sufficient to keep the skin in good condition. Fat children always need special care. A good superfatted soap should be used, and it may be found with some few children that the skin is so sensitive that no soap of any kind is tolerated. In these cases bran may be substituted; the bran bag must be squeezed and shaken in the bath until the water is quite thick.

Care of the Mouth. The importance of keeping the mouth clean is understood by all nurses. With a little baby particles of milk remaining in the mouth may become acid and give rise to "thrush."

With bigger children a dirty mouth is a common cause of disease and decayed teeth. The nurse may clean out the mouth with a soft rag and sterile water about twice a day until the teeth appear, after which a soft brush may be used. The utmost care and gentleness is necessary, for if the delicate mucous membrane of the mouth should become even slightly abraded it would form a suitable entrance for germs.

Care of the Eyes. The proper treatment of the eyes at birth has already been described, but its impor-

tance cannot be too strongly insisted upon. Many a child has lost its sight through neglect or carelessness at this time. Any inflammation or soreness of the eyes, however slight, must at once be reported to the doctor. Every morning and evening the eyes must be carefully bathed with boracic lotion or sterile water. The lids must be well opened and a little lotion squeezed into the eye, so that it may be well washed out. A separate piece of wool must be used for each eye and each piece used once only. The nurse's hands must be scrupulously clean.

Care of the Buttocks. The napkins must always be removed as soon as they are wet or soiled. If the baby is accustomed to being kept dry he will quickly learn to indicate by crying when changing is necessary. The buttocks must be washed with soap and water each time, and carefully dried after the soap has been rinsed off. For the first week it is well to smear the buttocks with vaseline in order to prevent sticking of the meconium; after that, powder should be used until the child is a few months old, when it is no longer necessary except in special cases. If the stools should be very loose, it is advisable to use vaseline or the buttocks might become sore. The napkins should always be washed at home to ensure their being well boiled and free from soda.

The Bowels. The child's bowels are usually opened a few hours after birth, although the first action may be delayed for a considerable time without harm. The first stools passed are of a substance known as meconium, a dark greenish, sticky material which is secreted in the intestines before birth; it consists chiefly of mucus, bile, vernix caseosa, and epithelium. After the second day the stools gradually change to those of the ordinary infantile type; bright yellow, semi-moist, and smooth. Most babies have three or four actions in twenty-four hours for some weeks, and continue to have more than one in twenty-four hours for the first year or two. It is

very important that the child's bowels should be trained to regularity of action from the very beginning. The proper time to start training in this respect is the first week. The baby should be held out every morning and evening after bathing, and he will soon learn what is expected of him.

The chief points to notice about the stools are : that they should not be green or clay-coloured, should not contain curd, be too watery, too frequent, or too hard, nor should there be any mucus or blood present. (See Constipation and Diarrhoea.)

The Bladder. Urine is often passed immediately after birth, but there is no need for anxiety even if twenty-four or thirty-six hours pass before the baby's napkins are wet, provided always that he does not seem to be distressed or in pain. If, after thirty-six hours, the bladder is not relieved, a warm fomentation or a little warm water poured over the parts will sometimes help. Failing this, the doctor had better be informed, though it must not be forgotten that urine is often passed unobserved in the bath. The urine first passed is pale and of low specific gravity, 1004. Normally it should not stain the napkin, though fine red grains of uric acid may occasionally be passed with it.

It is rather a disputed point how long a child should be allowed to wear napkins. Some children are easier to train in this respect than others, but I certainly think that by the end of the first year napkins should be entirely discarded, and not even worn at night.

The Cord. This should dry up and separate by the fifth or sixth day. If it has been kept clean and dry it usually leaves a nice, clean scar ; sometimes, however, it may slough off, leaving the navel a little red and sore. Clean dressings two or three times a day, and dusting with the special powder, will usually clear it up in a few days.

Crying. All little babies should be allowed a good cry every day. It is almost their only way of taking

exercise ; the lungs are thoroughly expanded, and all the limbs and muscles take part in the action. The crying must not, of course, be allowed to continue too long ; if the child is persistently fretful, the nurse may be pretty certain that something is wrong, and must find out what it is. The crying may be due to hunger, in which case the child sucks greedily at his fist or at anything else he can reach between the screams ; or if he is not satisfied with his feed, he will cry on being taken away from the breast. When the crying is due to indigestion or an over-distended stomach, he settles to sleep after the feed and wakes up again in about a quarter of an hour kicking and screaming. It may be intestinal pain, in which case the stools will be abnormal, or it may be that he is uncomfortable from cramped position, wet napkin, or too tight clothing.

Comforters must never be allowed. The habit of constant sucking is in itself harmful, it over-stimulates the digestive secretions and favours the growth of adenoids. In addition to this, the "dummy" is seldom clean, for it is constantly in and out of the baby's mouth, on the floor, in the street, and I have even seen it emerge from the nurse's pocket, each journey picking up and carrying back to the baby's mouth a fresh supply of germs.

Clothes. After a good deal of experience and many experiments with new fashioned and "reformed" garments for infants, I have come to the conclusion that there is nothing so comfortable, sensible, easy to adjust, and to wash, as a slight modification of the old-fashioned set. In skilled hands the child feels no discomfort on being robed and disrobed with these garments, while in unskilled hands all patterns are an abomination to him.

The chief points about the clothes are, that they should be roomy, soft, and warm. Wool is the best material for all except the topmost garment ; it is a non-conducting material, that is, it does not allow heat or cold to

pass readily through it. The heat of the body is retained, and the cold air kept out. It is absorbent, takes up the vapour from the body and lets it evaporate slowly. Vegetable fibres, such as cotton and linen, are less non-conducting and less absorbent; they allow a rapid loss of heat and hold moisture for a long time. A loosely woven material holds the heat better than a close one, so that flannels and woollies must be carefully washed and not allowed to become thick or felty.

The first set of clothes needed will be as follows :

Six day gowns. Six night gowns, 26 inches long. The kimono pattern is easy to make and to wash. The night gowns may be plain. The day gowns should be cut wider and have several tucks over the shoulder and down to the waist back and front. Four long flannels, cut high, with shoulder seams and a runner to draw up round the neck. Four vests. Four flannel binders. Four knitted binders. Six flannel pilches. Two or three dozen napkins. A light shawl, for the house. A large warm shawl, for walking. A bonnet or hat. Two woolly jackets.

This is a modest outfit, but it can easily be enlarged if expense is no great object. When washing need not be considered, the baby can easily do with a dozen little gowns (a clean one for each day) ; or, on the other hand, if economy must be studied, the gowns might be made of jap silk or nun's veiling, either of which is easy to wash at home.

The night-gowns should be of ample size, as baby continues to wear them for a long time. Soft flannel or nun's veiling is the best material.

The little vests, which now always replace the old-fashioned shirt, should have long sleeves and open all the way down the front.

The binder should be simply two strips of flannel each 5 in. wide, and as long as the width of the flannel. They are placed one piece over the other, and stitched

together down the centre of the back like a many-tailed bandage. This binder is easier to adjust over the cord dressing than the roller shape. After the first fortnight it may be replaced by a knitted one, which should be worn until the child is big enough for woollen combinations. The stiff cotton binders must on no account be worn. Little babies do not need to have their muscles supported in a splint; they need freedom and exercise for development.

Robes are only used for special occasions, and should not be provided at all when expense has to be considered.

For out of doors a warm shawl, with a woolly jacket under in cold weather, is the right thing. Woolly bonnets are the most comfortable for ordinary occasions, and a veil may be worn in cold or breezy weather, but not in summer time.

The short clothes should be ready by the end of the third month, although the time of shortening depends very much on the size and vigour of the child. The child must always and at all ages wear one layer of wool next to the skin, from the neck to the wrists and knees; the rest of the clothing may be varied according to taste, provided always that it is loose and comfortable.

The Nursery will be the largest and most sunny room available. Fresh air and sunshine are absolutely essential to healthy growth. The window of the nursery should never be closed, though the temperature of the room should not be allowed to fall below 60° F. at night or 65° F. by day. For a new-born or delicate infant it should be between 65° and 70° F.

Development of the Normal Baby.

At 3 months the posterior fontanelle closes.

At 4 months the child begins to grasp objects, and should be able to do so.

At 4½ months he should hold head erect.

At 6 months the sutures close. Teething begins.

At 7 months sits up.

At 9 months wants to stand.

At 10 months crawls

At 12 months stands up alone, tries to walk.

At 14 months walks.

At 18 months anterior fontanelle closes.

Good muscular development is as important as steady increase of weight. Digestive disturbance, or rickets, cause delayed development.

IV.

BREAST FEEDING.

THE best and only right food for young infants is the mother's breast milk. This is an oft-repeated truism, but it cannot be too often repeated, or too strongly insisted upon. The infant's digestive organs are suited to deal with this food and with no other. If for any reason the child be deprived of its natural nourishment, it becomes to some extent a premature infant, in that it is separated from its mother before it is physiologically prepared to be so.

For the child's sake, therefore, when breast feeding is possible, no other method should be considered. The advantages are great; the baby is contented and well nourished, it sleeps well and has little or no indigestion; diarrhoea, constipation, and rickets are seldom seen; and if a serious ailment is contracted at any time, it is quickly thrown off because the child's power of resistance is strong.

For the mother's sake also the advantages of breast feeding greatly outweigh the disadvantages. Her convalescence will be more rapid, she will more quickly regain her natural figure, she will learn to understand her baby better, and have the inestimable advantage of seeing it thrive.

The difficulties of breast feeding are few and easily overcome by good management. The first and most obvious trouble is that the mother will be greatly tied

during the nursing months ; but she will consider this a small sacrifice to make for the well-being of her child. Some ladies who would not do so otherwise, will nurse their babies willingly enough if the nurse undertakes that the child shall have grown accustomed to an occasional bottle before she leaves. The mother will then be less tied, and if she has any important engagement to fulfil will have no need to be worried or anxious at being detained beyond the baby's feeding time.

In such a case it is wise to start after the first fortnight by giving the child one bottle of modified cow's milk during the night, and if this agrees, to add a second bottle in the afternoon a little later on. Most babies will take these bottles without any disturbance, and at the same time their digestive organs will be gradually accustomed to rather more difficult work. The old idea that cow's milk and breast milk disagreed is quite a mistake ; and although breast feeding and nothing else is the ideal treatment, we must acknowledge that the infant that has some breast feeds, at least thrives better than the one that is entirely bottle fed. It is found, too, that many mothers who are not strong enough to nurse their babies entirely, will do so easily during the day if they have an undisturbed night's rest. These occasional bottles must, of course, be prepared with as much accuracy and aseptic care as when the child is entirely bottle fed.

As regards the management of breast feeding, the two chief points are regularity and cleanliness. The baby must be fed, as the old nurses used wisely to say, " by the clock."

Until the milk comes in freely, every six hours will be often enough to put the child to the breast ; this stimulates the secretion, and the child gets accustomed to the nipple before the breasts become full and hard. From the second day he should go to the breast every three hours from 6 a.m. to 10 p.m. A healthy child should always sleep at least six hours together at night, and must be encouraged to do so in order to rest the stomach.

Between the third and fifth month the interval between the feeds may be gradually increased until it reaches four hours. Regularity is very important, and it is necessary to observe that the child really takes a proper feed each time.

The three-hourly interval is now almost universally adopted. Babies thrive wonderfully upon it, though they do not as a rule gain weight very rapidly during the first fortnight. With babies much under the average weight, it may be advisable to feed every two hours for the first few weeks.

As to cleanliness, the conscientious nurse will be just as particular with a breast-fed baby as with a bottle baby. The mother's nipples must be washed with clean swabs wrung out of boracic lotion before putting the child to the breast; a little milk should be squeezed out of the nipple before the child begins to suck, as the first milk in the nipple sometimes contains micro-organisms; and the nurse's hands must be thoroughly washed before touching the breasts. This is especially necessary after having changed the baby's napkins.

When the child has finished feeding, he should be held up for a few minutes to enable him to bring up the wind, and then be quietly laid down in his cot and left to sleep.

It sometimes happens that, to begin with, the child does not appear to thrive at the breast. It must be remembered that this may be due to a variety of causes, and it should never be concluded that the food is insufficient or unsuitable until other possible causes have been carefully considered.

The mother may not really wish to nurse her child, and may, by quiet obstinacy and assumed stupidity, make it impossible for the little one to get proper feeds. In this case the nurse will be wise to inform the doctor and ask his permission to put the child on bottles; for if the mother will not nurse it properly under supervision, she certainly will not do so when left alone with it.

Occasionally the breasts are slow in starting their

functional activity ; this is more common with primiparae. In these cases the baby will need some temporary food, a weak cream and whey mixture being the best to begin with. The child will be put to each breast alternately at the usual intervals, and after every breast feed he must be given a supplementary feed of the whey mixture (see Bottle Feeding). In this way the breasts are stimulated to greater activity, and the mother is encouraged to persevere. In a few days there will probably be quite enough milk to satisfy the child without supplementary feeds.

When, after the full establishment of lactation, the supply of breast milk appears to be insufficient, it is important to make quite sure that the fault really lies with the breasts and not with the baby. The proper way to do this is to give the child a "test feed," that is, to weigh him before putting him to the breast and again after he has been really sucking for twenty minutes. The difference between the two weights shows the amount of food taken. If it is insufficient, the child must be put back to the breast until he has taken the proper amount, or if the breast is found to be empty the deficiency must be made up with a feed of modified cow's milk, and the nurse must do everything in her power to increase the secretion. Good nourishing diet, not too rich, and a little fluid such as milk or cocoa taken about half an hour before baby's feeding time will often encourage the flow and increase the quality. Cocoa, however, should not be given for the first few days, as it sometimes induces a sudden influx of milk, which is accompanied by pain and distension. Alcohol is seldom advisable during the early months, but it may sometimes be useful as the child gets bigger, for the milk of a mother who takes stout is said to contain more proteid. The mental attitude of the mother is a great factor ; she must on no account be allowed to become fretful or depressed ; rest and quiet, cheerful society, and a happy outlook do much to promote a healthy function of the breasts. If after a time the

supply of milk does not increase, it is perhaps wise to substitute certain of the breast feeds by bottles entirely.

In cases of excessive secretion the milk is usually rather poor in quality. The proper treatment is then to draw off a certain amount before putting the child to the breast; the last part, or "stripping," being richer in cream. In this way the child gets the best part of the milk and does not acquire the habit of over-distending his stomach with too large a feed. The quantity of food taken by the mother should be somewhat restricted.

The quality of the milk may be also adversely affected by injudicious diet on the part of the mother, unsuitable aperients, over-excitement, or worry.

Want of success in breast feeding may sometimes be due to the child rather than the mother. Although most babies take easily to the breast from the beginning, it is not rare to find a child that has no idea of sucking when it is born. Such a child may need considerable training before it can be induced to take the breast properly. It is often proposed in these cases to starve the baby into compliance, which course usually results in hysterical despair on the mother's part, and in hopeless and exhausted rage on the baby's. The proper method is to encourage and coax the baby, and to stimulate the mother with promises of ultimate success. First of all the mother must be made quite comfortable. She must lie on her side and rest easily on the pillows. The little one must not be irritated or flustered, but placed gently on his mother's arm so that the nipple lies exactly opposite his mouth. If he has to stretch his head to reach it, he will get cross and refuse to suck. Having settled him with the nipple in his mouth, a little milk may be gently squeezed out to encourage him.

If after patient trial this fails, he must be allowed to begin with the nipple shield, and when he has learnt to draw it well and to enjoy the milk, it must be taken away and the nipple substituted. After each lesson

some milk may be drawn off the breast and given him by the bottle or spoon. In obstinate cases it may even be necessary to teach the child to suck by placing a well-scrubbed finger in his mouth, and then coaxing him from that to the nipple.

These troublesome cases are chiefly with delicate or immature babies. There are, of course, also certain malformations, such as harelip, cleft palate, and tongue tie, which render sucking difficult or impossible.

Ill-formed nipples may create quite a serious difficulty, though it is seldom that it cannot be overcome with patience and contrivance. The flat soft nipple is the least troublesome, and baby may generally be coaxed into sucking it after a few days if it is gently pulled out and held in his mouth. The tough inverted nipple is much more difficult, for it is usually tender, and for the first week, at least, painful when drawn out. The child must be allowed to take it with a nipple shield at first, though he will probably be able to draw it out with his mouth later on.

Care of the Breasts and Nipples. This is a very important point in the management of breast feeding. Cracked nipples are a special source of danger, for not only do they seriously interfere with nursing by making it a painful process, but they sometimes give rise to septic infection of the breast and abscess formation. Cracks are most likely to appear during the first week of nursing, the most frequent cause being that the child is allowed to suck too long or too often before the milk comes in, or to lie with the nipple in his mouth after he has finished his feed; another occasional cause is want of cleanliness. The nipples should be dried and smeared with glycerine and borax each time after use. If cracks do appear they should be painted with "Friar's Balsam," which must be washed off before the next feed. A nipple shield sometimes makes the nursing less painful, or if the cracks are very bad it may be necessary to suspend breast feeding altogether for a few days, and to relieve the

breast meanwhile by gentle massage or a breast exhauster. The nipple must be kept covered by a sterile dressing.

Occasionally the breasts become very hard and painful about the third or fourth day. They may be so full and tense that it is impossible for the child to relieve them, or even to hold the nipple. Some of the superfluous milk should then be drawn off with the exhauster, and if the breasts continue to be painful hot fomentations will give relief. If pendulous or heavy they must be supported and lifted with a suitable binder.

Some few breasts get hard and knotty soon after delivery and yet secrete very little milk; for these the best treatment is gentle continuous massage. The nurse must use clean fingers dipped in warm oil, and work steadily and evenly from the base of the breast towards the nipple; she must continue this movement for about twenty minutes on each breast. The effect is soothing, and the condition of the breasts is considerably improved. Massage must never be employed when there is any inflammatory condition; the doctor must at once be informed in that case, and in the meanwhile hot fomentations may be applied.

Conditions under which breast feeding is contra-indicated.

A mother should not nurse her child if she is tubercular, suffers from kidney disease, heart disease, general debility, or any acute illness, or if after conscientious and patient trial it is found that the child does not make satisfactory progress or the mother suffers in health. The return of the menstrual periods is not necessarily a contra-indication to breast feeding, though it may be advisable sometimes to suspend it while the period lasts.

Signs that the baby is doing well. If the child gains weight steadily, sleeps well, does not cry much, does not vomit, has healthy stools and a good muscular action, he is doing well.

If he loses weight, cries constantly, does not vomit, has small irregular stools, he is probably having too little food.

If he vomits, increases too rapidly in weight, has pain, passes large curdy stools and much urine, sweats excessively, he is having too much food.

If it is proved by test feeds that the quantity taken is correct and yet the child does not thrive, the fault probably lies with the food itself. Milk, poor in quality, may sometimes be improved by giving the mother extra fat and proteid and by encouraging her to take exercise, or the baby may be given a little extra fat in the form of cream or cod-liver oil between the feeds. When the milk is too rich the child should have a small quantity of boiled water and lactose before going to the breast and then a smaller breast feed. In any case breast feeding should never be hastily abandoned without a fair and patient trial.

Weaning. At nine months old the baby must be weaned. From this time the mother's milk becomes weaker and less in quantity. The child begins to require more variety of food; his digestive organs having developed, he is able to deal with a limited amount of starchy food. Should he be kept too long at the breast he would most probably become rickety, and the mother would certainly suffer from strain and debility.

If he has been accustomed to one or two bottles a day, there will be no trouble about the weaning; the number of bottles will be increased each week until he is taking all bottle feeds and no breast. If he has been entirely breast fed, it is still right, and better for both mother and baby, that he should be weaned gradually, beginning with one or two bottles a day and increasing steadily.

When for any reason there is urgent necessity for suddenly taking him from the breast, the mother must have a good dose of saline aperient each morning to stop the secretion. She should also be cautious as to her diet and restrict the amount of fluid she takes.

The baby should not be weaned during the very hot weather, the months of July and August being particularly unfavourable; nor should he be weaned when he

is unwell, except under a doctor's direction. The first bottles a child takes at any time or any age should be considerably diluted; they may be strengthened gradually until the food is of the right proportions for the child's age. Any sudden change to a new diet is likely to irritate the digestive organs until they have become accustomed to the new food.

Wet Nursing. When, for some unavoidable reason, the mother is unable to nurse her child, the question arises as to which of the alternative methods of feeding is the most satisfactory. Theoretically, I suppose, there can be no doubt that a wet nurse is the best substitute for the mother; and in many country places it may be still quite possible to find a respectable woman whose antecedents are known, whose children are healthy, and who is in every way fit and able to make a good foster mother. In France, where, owing to the low birth-rate, infant life is very highly prized and infant nurture widely studied, it is a common practice for ladies to send their young babies to be nursed among the peasantry. But I regret to say the French women are, in this respect, far superior to the English; for we rarely find, in our towns at least, that any woman is either able or willing to nurse another child besides her own.

Should it be decided, however, to attempt wet nursing, it would be necessary for the doctor to see the foster mother and satisfy himself that she was a suitable person. There is then no reason, if she is properly managed and the feeding well supervised, why the experiment should not prove a success.

The foster mother must live a healthy life. She must be kept suitably occupied, take sufficient fresh air and exercise; her diet must be wholesome, but not too rich. She should certainly be allowed to have her own child with her, or she will fret and worry, and her milk will deteriorate. A good nursing mother ought to be able to give her own baby one or two feeds a day as well as providing for her foster child. The breasts need the

stimulus of a strong child's sucking in order to maintain a good secretion, and it is seldom that this stimulus can be provided by the delicate little foster child.

It is understood, of course, that a syphilitic child should not be given to a foster mother, though it is said that the child's own mother derives no harm from nursing it.

Usually it is considered that the difficulties involved in wet nursing are so great that the experiment is not worth making, and it is then necessary to decide upon some other form of nourishment for the unlucky infant that is deprived of its natural food.

V.

BOTTLE FEEDING.

Composition and Digestion of Milk. The best substitute for human milk is the milk of some other animal. In this country cow's milk is the one most commonly used, partly because it is the easiest to obtain fresh, and partly because it has been found to be the most generally suitable. But it will be understood that a food which is just right for young calves with their strong digestive organs will hardly be suited without some modification to the delicate digestion of a little baby.

The perfect food for young babies contains all the constituents that are necessary for growth and nutrition ; these are in certain definite proportions, and in such a form that they may be easily digested and assimilated. It also provides for the slow but progressive development of the child's digestive organs. These conditions, which are found in the human breast milk, are not easy to supply in any artificial food, but it is generally acknowledged that the food upon which an infant will thrive best is the one that approximates most nearly to its natural food.

We have, therefore, first to consider the constituents and composition of human milk ; then in what points it differs from cow's milk, and how the latter may be treated in order to minimize these differences. The following tables give the average percentage composition of the two milks :

	<i>Human Milk.</i>	<i>Cow's Milk.</i>
Proteids, - - -	1·5	4·0
Fat, - - -	4·0	4·0
Sugar, - - -	7·0	4·4
Salts, - - -	0·2	0·6
Water, - - -	87·3	87·0
	Reaction alkaline.	Reaction acid.

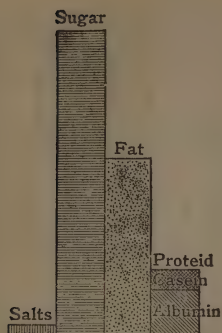
Proteids build up the tissue and repair waste ; they are indispensable to growth, but most of them demand considerable powers of digestion to render them soluble. In milk there are two chief kinds of proteid, *Casein* and *Lact-albumin*.

Lact-albumin, which forms two-thirds of the proteid of human milk, is very easily digested ; it passes through the stomach almost unchanged and is acted upon by the mixed secretions of the small intestines and pancreas, digestion being almost entirely intestinal.

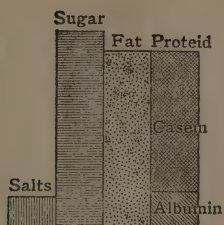
Casein forms only *one-third* of the proteid of human milk, but about *five-sixths* of the proteid of cow's milk. It is the part of cow's milk that the child has most difficulty in digesting.

On reaching the stomach the casein is first acted on by a ferment called rennin, which converts it into clot. The clot is then broken up by the movements of the stomach, and some part of it is changed into peptones and albumenoses by the action of pepsin and hydrochloric acid ; it then passes into the intestine, where it is rendered alkaline, and the digestive process is completed by the intestinal and pancreatic ferments.

The clotting, or curdling, which is the preliminary part of the digestive process, is brought about by a combination of the calcium salts in the milk with the rennin in the stomach ; if the milk contains much calcium salts, the clot formed in the stomach is very tough and solid ; it is also a little more solid when the clotting takes place in a highly acid medium. Human milk is alkaline and contains calcium salts in moderation,



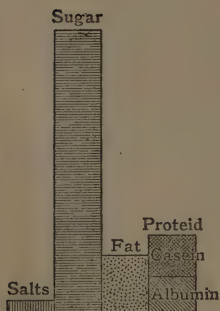
Human Milk
The ideal proportions



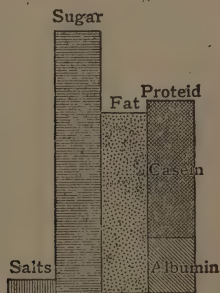
Cow's Milk
(Excess of proteid,
deficiency of sugar)



Cow's Milk diluted with equal part of water
(Deficiency of sugar & fat)



Asses Milk



Goat's Milk

so that a soft flocculent curd is formed, which is easily acted upon by the different digestive ferments, and passed through the narrow pyloric opening into the small intestine.

Cow's milk, however, besides being quite acid, contains an excess of calcium salts; it forms a dense solid clot similar to junket, which is broken up and digested by the infant with difficulty. Some curdling of the casein is also produced by the lactic and hydrochloric acid in the stomach apart from the rennin, but these acid curds are soft, light, and easily digested.

Fat supplies heat and energy, helps digestion, and nourishes the nerves; it is a very important element in the diet of children of all ages. It passes unchanged into the intestine, where it is split up into glycerine and fatty acids by the secretions of the small intestine and the pancreas, and by the bile, which also emulsifies and saponifies it. Fat is the only food element upon which bile has a direct action, though the presence of bile is stimulating to the other secretions.

Sugars and starches are very similar in their effect, and may with older children to some extent replace each other. They will not take the place of fat, although their function also is to produce heat and energy. There is no starch present in milk, the child having no power of digesting it for the first six months. Sugars and starches are much cheaper than fats, and consequently are often given in excess among the poorer classes. The result is poor nutrition and rickets.

Some sugars are absorbed without change, others are rendered slightly more soluble and easily absorbed by the intestinal secretion. Lactic acid is formed in the stomach by the action upon sugar of certain ferments and bacteria, so that an excess of sugar causes gastric fermentation.

Starch must be converted into sugar before it can be absorbed. The digestive ferments which convert starch into soluble sugar are not secreted until about the sixth

month, at which time ptyalin is first found in the saliva. The action of this ferment upon starch begins in the mouth, and continues after the food passes to the stomach until it is arrested by the acidity of the gastric juices. The conversion of the starch is completed in the intestine by a pancreatic ferment, which is also not secreted until after the first few months.

Salts. These help to form bone and certain acids necessary to digestion.

Water. The tissues of the body contain 75 per cent. of water ; it is therefore an essential part of the diet. It helps the solution of the other constituents and is useful in washing away poisons from the system.

Besides these definite constituents there is an element known as the *anti-scorbutic element*, because it prevents a disease called scurvy. Exactly what this element consists of is not yet known, but it is present in fresh milk, vegetables, fruit, and uncooked meat. It is usually destroyed by cooking ; children do not thrive when altogether deprived of it.

Modification of Cow's Milk. By comparing the table on page 32, it will be seen that the chief differences between cow's milk and human milk are :

1. Cow's milk contains twice as much proteid as human milk.
2. The proteid of cow's milk is composed chiefly of casein, whereas that of human milk is chiefly lact-albumin.
3. The casein of cow's milk is more difficult to digest than the casein of human milk.
4. There is a deficiency of sugar and an excess of salts in cow's milk.
5. Cow's milk is acid, human milk is alkaline.

The greatest difficulty the child has to contend with in the digestion of cow's milk is the excess of proteid, and especially of casein. By diluting the milk with water we may reduce the quantity of proteid to about

the same as in human milk, but we shall then reduce the other constituents in the same proportion, and shall find fat deficient and sugar still further decreased. (See Fig. 2.)

The fat deficiency may be corrected either by adding cream or by using a milk that has an excess of fat to begin with; that is, the top part of the milk after it has stood for several hours. The sugar deficiency is made up by adding lactose (sugar of milk) or pure cane sugar.

For some babies this simple modification will be quite enough; they will easily be able to digest and assimilate a food so treated. We must remember, however, that not only was the casein excessive in quantity, but it was also different in quality, and with many children, during the first two months at least, the digestive organs are not sufficiently developed to deal with cow's casein even when diluted. There are several modes of treating the milk in order to render the casein easier of digestion.

(1) We may dilute the milk with barley water or gelatine water instead of plain water. This acts mechanically by mixing with the casein and preventing the formation of a solid clot. The disadvantage of barley water is that even when properly prepared it contains a small quantity of unconverted starch which may be quite sufficient to upset a delicate digestion. Oatmeal water and rice water contain much starch, and are quite unsuitable for young infants.

(2) We may neutralize the acidity of the milk by adding an alkali. Lime water, 1-2 drachms, or bicarbonate of soda, 1-2 grains, to each ounce of milk. This hinders acid curdling and makes the rennin curds somewhat less dense.

(3) We may add citrate of soda to the milk, 1-2 grains to each ounce of pure milk. The citrate of soda, by combining with and precipitating the calcium salts, delays or prevents the formation of tough rennin curd. Gastric digestion is then less active, and more of the proteid is

digested in the intestine. Citrate of soda is said to possess anti-scorbutic properties; it is not constipating unless given for very long periods.

(4) We may abstract the casein altogether by curdling the milk with rennet, and substituting whey, partly or entirely, for milk. Whey contains all the constituents of milk except casein and fat. It is not sufficiently strong in proteids for prolonged use, but by giving whey with a little cream to begin with, and then gradually adding small but increasing quantities of whole milk, the child's digestive organs may be slowly trained to deal with casein. In cases of extreme delicacy, where casein is not tolerated at all, some other easily digested proteid, such as white of egg or meat juice, may be added to the whey. (See page 45.)

(5) Lastly, in very difficult cases, where no form of proteid or modified milk is digested, we may give the milk pre-digested or peptonized, and diluted with a sufficient quantity of water.

The following table gives the approximate proportions and quantities suitable for a healthy child at the different ages, but it must be remembered that there is no golden rule for infant feeding; each child should be carefully watched and the food adjusted to its individual needs.

Some authorities consider that for the first week or two it is always advisable to pre-digest the food, or to give whey feeds, passing on gradually to ordinary diluted mixtures. The reason for this is that the first milk secreted by the human breast, which is called colostrum, contains practically no casein, only albumin proteid; so that in a natural course a breast-fed baby would not be required to deal with casein during the first few days. Again, big healthy babies may often begin the four-hourly interval at the third or fourth month, and many will thrive on undiluted milk after the second month.

A second meal should never be given until the first one is digested and the stomach empty. Human milk

FOOD TABLE FOR NORMAL INFANTS.

Age.	Whey.	Milk.	Cream.	Lactose.	Water sufficient to make	Amount of each feed.	Interval between feeds.		No. of feeds in 24 hours.
							Day.	Night.	
1 day	—	—	—	$\frac{1}{2}$ drm.	1 oz.	2 drm.	6 hrs.	6 hrs.	3
2 days	—	4 drms.	1 drm.	1 "	4 "	4 "	3 "	" "	7
or	2 oz.	—	1 "	1 "	4 "	4 "	" "	" "	"
3 days	—	1 oz.	$1\frac{1}{2}$ drms.	2 drms.	6 "	6 "	" "	" "	"
or	3 oz.	5 drms.	2 "	2 "	6 "	6 "	" "	" "	"
4 days	—	2 oz.	2 "	3 "	8 "	1 oz.	" "	" "	"
or	2 oz.	1 "	3 "	3 "	8 "	1 "	" "	" "	"
1 week	—	3 "	3 "	4 "	10 "	$1\frac{1}{4}$ oz.	" "	" "	"
2 weeks	—	4 "	$4\frac{1}{2}$ "	$4\frac{1}{2}$ "	12 "	$1\frac{1}{4}$ oz.	" "	" "	"
3 "	—	6 "	6 "	6 "	15 "	2 "	" "	" "	"
4 "	—	9 "	6 "	7 "	18 "	$2\frac{1}{2}$ "	" "	" "	"
2 months	—	12 "	1 oz.	1 oz.	20 "	3 "	" "	" "	6
3 "	—	15 "	1 "	1 "	24 "	4 "	" "	8 "	"
4 "	—	20 "	6 drms.	6 drms.	28 "	$4\frac{1}{2}$ "	" "	" "	5
5 "	—	24 "	—	4 "	28 "	$5\frac{1}{2}$ "	4 "	" "	"
6 "	—	30 "	whole milk	—	—	6 "	" "	" "	"
8 "	—	30 "	one feed thickened	—	—	—	" "	" "	"

To each oz. of milk add 2 grains of bicarbonate of soda. If the food is not very well digested, citrate of soda may be substituted partly or entirely for the bicarbonate of soda in the same proportion.

is said to pass out of the stomach in from one and a half to two hours ; cow's milk in from two to three hours, or even longer when undiluted.

If the milk from which the mixtures are made is allowed to stand for four hours, and the top third only used, extra cream will be unnecessary. When it is practicable this is a better way, because in towns, at least, commercial cream is likely to be stale and to contain preservatives. After the second month the top half instead of the top third of the milk should be used, as less diluent is added. An ordinary glass or enamel douche can makes a good reservoir for the milk, the lower part may then be easily drawn off. The can must, of course, be scalded out and the tubing boiled every day. The milk must stand covered in a cool place, if possible in a refrigerator.

The Preservation of Milk. The milk must be perfectly fresh and pure, and contain no colouring matter or preservatives. It should be obtained from a large reliable dairy and delivered in sealed bottles. It need not be "nursery milk"; the ordinary milk of a good dairy, guaranteed to contain 4 per cent. fat, is the best. The old idea of feeding the child on the milk of a single cow is a mistake, for then any little temporary change in the diet or condition of the cow is felt by the nursling. The mixed milk of a number of healthy and well-kept cows is the safest.

There has been a good deal of discussion and controversy as to whether it is wise to sterilize the milk or not. Some authorities advise one thing and some another, each giving excellent reasons *pro* and *con*. There can be no doubt that there are serious disadvantages to sterilization, and if we could be sure of securing a milk perfectly fresh and free from contamination, it would be better to use it uncooked. Under our present conditions of milk supply and delivery, however, the dangers of raw milk greatly outweigh the disadvantages of heating. Ordinary commercial milk is found to contain 3,000,000

micro-organisms to a cubic centimetre (16 minims) and often more. At a temperature of 97° F., one germ may, in six hours, increase to 3,800. Many of these germs are harmless, but others which increase quite as rapidly cause disease and putrefaction.

If milk is to be kept for an indefinite time, that is several weeks or days, it will be necessary to destroy all the spores as well as the germs. The only way to do this is to bring it to a heat of 212° F. for five minutes, which will kill the germs; then keep it at about 60° to 70° F. (the most favourable temperature for the development of spores) for six or eight hours; boil again to kill the germs which have developed; repeat the process once more, and then store the milk in hermetically sealed bottles. Milk treated in this way will remain sweet almost indefinitely. It is the process by which commercially sterilized milk is prepared; but it should only be used under exceptional circumstances, such as traveling, and for a short time, as children will not thrive on stale milk even though it be sterile. It is rarely necessary to preserve milk for more than twenty-four hours.

Pasteurization. Bring the milk to a temperature of 155° F. to 165° F., and keep it at that temperature for twenty minutes, then cool down rapidly and stand in a cold place. A temperature of 160° F. for twenty minutes is *said* to destroy all pathogenic germs, though some authorities now contend that the tubercle bacillus occasionally survives; the spores are not destroyed, but very few pathogenic germs are spore-forming, and if the milk is kept at a low temperature (under 50° F.) the spores will not develop. The chemical changes in the milk after pasteurizing are so slight that they are no disadvantage.

The best way to prepare the milk is to use a Soxhlet or similar apparatus. Enough food for twenty-four hours is mixed according to the formula; the right quantity for each feed is then measured out and poured into separate bottles. The rubber caps are adjusted

on the bottles, and they are placed in the wire frame in the saucepan surrounded with enough hot water to reach the level of the milk. The saucepan is placed on the lamp or gas, and its contents heated to the required temperature as quickly as possible ; at the end of twenty minutes the bottles are taken out and cooled rapidly in cold water. They are then stored in a refrigerator or cool cellar till required. The temperature of the milk must never be allowed to rise above 160° F., and quick cooling is essential to prevent development of spores. When the feed is due, the cap is removed from the bottle and replaced by a teat, and the milk is warmed by standing the bottle in a jug of hot water for a few minutes.

If the Soxhlet apparatus is too expensive, ordinary medicine bottles may be used and heated in a saucepan in just the same way. Seven bottles will be needed for twenty-four hours. They should be packed round in the saucepan with tow to prevent cracking, and plugged with clean cotton wool. An "Allenbury teat" is the best for these bottles. They must be well washed after use and boiled every day, as must everything else that is used in preparing the food, such as brush, jug, teats, measures, etc.

Boiling. This is a simpler process. If the person who prepares the food cannot be trusted to keep it at the right temperature, it is wiser not to attempt pasteurization, but to just bring the water in which the milk stands to boiling point for two minutes, and then cool rapidly. The effect on the micro-organisms is much the same as with pasteurizing, but the milk undergoes some slight deterioration. The mixture may be boiled in a double saucepan, and then kept in a clean jug covered with muslin, and stood in a basin of water in a cool place. This, however, is not as sound a method as the separate sealed bottles ; the food is much more likely to become contaminated in careless or unskilled hands.

Sterilization. By this process the water in which

the bottles stand is brought to boiling point (212° F.), and kept boiling for forty-five minutes. All the germs and most of the spores are killed ; and besides this, the calcium salts are precipitated, so that the casein does not clot easily, if at all, in the stomach. The disadvantages are : that sugar is converted into caramel at a temperature of over 170° F. ; that part of the lactalbumin is coagulated and forms a scum (this is not very serious, as the child is able by this method to digest more casein) ; that lactic acid is not formed from the milk in the stomach (but the infant usually produces enough apart from its food) ; that the anti-scorbutic properties of the milk are destroyed. This last is the most serious objection, but it may be overcome by adding some other anti-scorbutic food to the diet, such as fruit juice or meat juice.

Finally, it must be remembered that no amount of sterilization will make bad milk good or do away with poisons already produced, and that boiled milk, unless cooled quickly and kept cool, will decompose as easily as fresh milk.

Other Methods. There are various other methods of infant feeding which are advocated by different authorities, and should be understood by the nurse.

Percentage Feeding. With this method the medical practitioner writes a prescription giving the exact percentage composition of the food he wishes the child to have, as well as the temperature to which he wishes it heated, and the size and number of feeds for twenty-four hours. This prescription is sent to one of the large dairy companies, the food is prepared in their laboratory according to the formula, and delivered every day in small sealed tubes, each containing the right amount for one feed. The milk used in the preparation of these formulae is produced by cows kept on a special dairy farm. The farm is conducted on the most modern sanitary principles ; the cows are of specially selected breed, healthy, and good average milkers. They are

milked with all antiseptic precautions. The milk is at once cooled and conveyed to the laboratory, where, throughout all manipulations, it is carefully guarded against the possibility of contamination.

This elaborate process, which involves skilled workmanship and rigorous supervision, makes this method of feeding an expensive one. Pure milk for home modification, however, may be obtained from these farms at a less cost than the formula feeds. It is known as laboratory milk. These laboratories, which originated in America, were first introduced into England by the Walker Gordon Company.

Whole Milk Feeding. In France nearly all the bottle babies are fed on whole sterilized milk. The method was introduced by Professor Budin in his famous infant consultations. He claims the most satisfactory results, and, according to his account, healthy full-time children thrive wonderfully on this diet. Nurses who are interested in infant feeding should read his book, *The Nursling*, of which there is now an English translation.

Undiluted sterilized milk, usually with the addition of citrate of soda, has also been used for very young babies with considerable success by a number of English physicians, but most of our authorities do not advocate its use for normal infants before the third or fourth month.

It has already been explained that the calcium salts are precipitated by prolonged boiling (at least forty-five minutes, each feed in a separate bottle), the casein being thus rendered more digestible.

Other advantages claimed by the advocates of whole sterilized milk over modified milk are, that being stronger in digestible proteids, it is more nourishing; that the other constituents of the milk are not weakened; that a smaller quantity of food being necessary, the stomach does not become over-distended; that the method is simple, and less manipulation being necessary, there is less risk of contamination; that no amount of

modification will render cow's milk identical with human milk.

Goat's Milk. Goat's milk is very similar to cow's milk in composition, but somewhat stronger in every constituent. It is said to be proof against tuberculosis. It may be useful in cases where the supply of cow's milk is of doubtful purity, or where the child has an inherited



1. A bad feeding bottle.
2. A good feeding bottle.
3. The "York Road" premature bottle (supplied by Messrs. Bailey).
4. The best feeding bottle (Soxhlet type).

tendency to tuberculosis. It should be used in the same proportions as cow's milk, but without extra cream.

Asses' Milk. The milk of the ass is more like human milk. It has a casein that approximates to human casein and is easily digested. It is rather weaker than human milk in all constituents, especially cream, and is therefore unsuitable for prolonged use. For delicate infants or those with weak digestions it may be given for short periods with added cream.

Dried Milks. These are more or less modern products. They differ from patent foods in that they consist entirely of milk from which the water has been abstracted. There is no addition in the form of carbohydrates, and in the full cream varieties no fat is taken away. The addition of water according to directions (usually 1 oz. to 1 drm. weight of dried milk) returns the milk to its original proportion of food elements. If, as is usually the case, it was made from whole cow's milk, it must then be diluted again, sugar and fat added, to bring it up to the standard of human milk. A few brands, of which "Glaxo" is one, are produced from milk which is modified before being desiccated; in these cases simple dilution only is necessary.

These milks are very useful in poor homes where facilities for the storing and sterilising of fresh milk are absent, or where the purity of the milk supply is doubtful. In many cases, also, children who have difficulty in digesting the casein of fresh cow's milk will deal quite easily with dried milk.

When a half cream or skimmed variety of dried milk is used for economy's sake, extra fat in some form must be added.

A child fed exclusively upon dried milk must, as with sterilised milk, have in addition some fresh fruit or vegetable juice to supply the deficiency of vitamins.

Condensed Milk. This is very popular among the poorer mothers for obvious reasons. It is the household milk in these homes, it keeps well, it is cheap, babies like it, usually digest it well, and get fat on it. It is most unsuitable as a permanent food for the normal baby, because it contains an excess of sugar and is deficient in fat. It is, however, easily digested, and may sometimes be usefully employed under a doctor's direction in cases where the excess of sugar and deficiency of fat would not be harmful for a short period.

The above objections do not apply to the unsweetened varieties, but they do not keep very well.

With regard to the practical details of artificial feeding, there is very little that need be said to the trained nurse ; but it may be well to go over the few important points which she must remember to teach those into whose charge she will give the baby when she leaves.

Regularity of feeding is essential.

The food must be given at a temperature of 100° F.

The stopper must not be removed from a Soxhlet bottle until it is wanted for a feed.

The feeding bottle must be held during a feed, and held in such a position that the teat is full of milk, and the child does not suck in air.

The teat and bottle must be washed immediately after use ; the teat kept in a weak solution of soda-bicarbonate, and boiled once a day.

The nurse must never put the teat in her own mouth.

When preparing the feed or feeding the child, the nurse's hands as well as all utensils must be scrupulously clean.

No food must be kept in the nursery.

If the child is unwell the food must be given more diluted than usual.

Feeds for Delicate Babies.

- | | |
|---------------------------------|--------------------------|
| 1. Albumin water, 1 oz. | 2. Whey, - - 2 oz. |
| Whey, - - 1 oz. | Meat juice, - 1 dr. |
| Cream, - - 1 dr. | Cream, - - 1 dr. |
| Lactose, - 1 dr. | Lactose, - 1 dr. |
| 3. Meat juice, - 1 oz. | 4. Asses' milk, 17 oz. |
| Bread jelly, - 4 dr. | Cow's cream, 3 oz. 4 dr. |
| Cream, - - 1 oz. | |
| Water to make $\frac{1}{2}$ pt. | |
| Lactose, - 1 oz. | |

To make Whey. Take one pint of fresh milk, heat it to 100° F., add one teaspoonful of liquid rennet and stir it well in. Allow it to stand in a cool place for about

twenty minutes, and then break up the curd which will have formed, and strain the fluid off through muslin. This whey contains .8 per cent. to 1 per cent. of albumin and 4 to 5 per cent. of sugar. Nearly all the casein and fat are in the curd.

Before adding milk or cream to the whey, it must be brought to a temperature of 160° F. in order to stop the action of the rennet, otherwise the added milk or cream will curdle.

Humanized Milk (so-called). A mixture which is commonly sold as "Humanized milk" is made as follows, and is sometimes useful for babies of weak digestion :

$\frac{2}{3}$ pint of whey.
 $\frac{1}{3}$ pint of milk.
4 drms. of cream.

This should be pasteurized in the usual way after mixing, but whey, or the milk that whey is made from, should never be boiled, as that would deteriorate the albumin.

White Wine Whey. Take one pint of milk, add 2 oz. of sherry and 1 oz. lactose, bring to boiling point and strain. This whey is not as nutritious as rennet whey, because some of the albumin is destroyed by boiling, but it contains a small percentage of alcohol, and is sometimes given for a short time in cases of extreme debility.

Peptonized Milk. To one pint of milk add $\frac{1}{4}$ of a teaspoonful of soda-bicarbonate, one tube of Fairchild's peptonizing powder, 4 oz. of water ; heat it to a temperature of 110° F., and let it stand for five to fifty minutes, according to the degree of peptonizing required. Then heat to 212° F., or boiling point, in order to stop the peptonizing action, and dilute as required with boiled water.

Albumin Water. Take the white of three eggs, beat gently for a few minutes, and shake it up in 1 pint of cold boiled water.

This is given cold or slightly warm as ordered by the doctor. Sugar and cream are sometimes added.

Meat Juice. Take 2 oz. of lean rump steak, finely minced, and put in a cup with 2 oz. of cold water ; let it stand for an hour and then squeeze through muslin.

This will not keep long, and must be made twice daily. It may be given in a bottle of modified milk, or separately with an equal quantity of cool boiled water and a little lactose.

Barley Water. Well wash one tablespoonful of pearl barley, add a pint of cold water, bring it to boiling point, and let it simmer until it is reduced to $\frac{3}{4}$ of a pint. Strain. Barley water must be made twice daily.

Gelatine Water. Take 2 drms. of gelatine and let it stand for three hours in $\frac{1}{2}$ pint of cold water. Then, if not dissolved, boil it in a double saucepan. This when cold will form a jelly, of which one teaspoonful may be added to each oz. of food.

Bread Jelly. Soak 4 oz. of stale bread in cold water for eight hours ; then squeeze it dry and boil it in a pint of fresh water for two hours. Rub the pulp through a sieve, and when it is cold it will form a jelly.

This is usually given in the proportion of 1 tablespoonful of jelly to 8 oz. of food.

Fruit Juice. In raw milk there is a certain living quality which is essential to the health of young infants. This quality, which is said to be due to the presence of bodies known as vitamins or accessory growth substances, is destroyed when the milk is subjected to great heat. It is therefore necessary to provide it in some other form in the case of infants artificially fed. Accessory growth substances are present in moderate quantities in grapes, more freely in oranges, and very generously in potatoes and certain vegetables, especially raw turnips and swedes.

Quite young babies may have grape juice, orange juice, raw turnip or swede juice ; half a drm. strained, and diluted with an equal quantity of water, before the morning bath. For this purpose a slice of swede or turnip is scraped or cut up finely and strained through muslin. If a cut root is used the outside slice should be cut off and thrown away each day.

VI.

PATENT FOODS AND DIET AFTER NINE MONTHS.

Patent Foods. For the normal newly-born infant patent foods are unnecessary and even harmful. But there are a few exceptional cases in which they may be of service for short periods to tide over difficulties and emergencies.

A patent food should never be given without a doctor's order, and it should always be explained to the parents that these foods are for temporary use only. The immediate results often appear to be satisfactory, and the child is contented and seems to improve; it is only after the food has been taken for several weeks or months that the ill effects appear, and it is discovered that the child is forming unsound tissue and becoming rickety.

The advantages of these foods are: 1. The proteid is more digestible than that of fresh milk, being tolerated with ease by quite delicate babies. 2. There is very much less danger of bacterial contamination during the hot weather and in poor districts. 3. They keep well, and are therefore convenient for travelling. The first two of these conditions may be equally well secured by treating cow's milk in the manner already described.

The disadvantages of patent foods are: 1. That they are nearly all deficient in fat, a most serious defect. 2. Most of them contain an excess of sugar. 3. Many of them, even when advertised as first foods for infants,

contain starch. 4. They contain no vitamins or accessory growth substances.

They are usually spoken of in two groups: 1. Those which are used as substitute for cow's milk. 2. Those which are used as an addition to cow's milk. They may then be subdivided as follows:

1. *Those used as a substitute for cow's milk.*

- A. Condensed milks and Dried milks.
Nestle's. Glaxo. Trumilk.
Milkmaid. Lacta. Cow and Gate.
Ideal. Ridge's desiccated milk.

B. Dried milk and cereal—starch converted into soluble carbo-hydrates:

Allenbury. Nos. 1 and 2.
Horlick's Malted Milk.

C. Dried milk and cereal—starch partly converted into soluble carbo-hydrates.

Milo Food.
Carnick's Food.

D. Dried or condensed milk and cereal—starch mostly unconverted.

Nestle's Food.
Anglo-Swiss Food.

2. *Those used as an addition to cow's milk.*

E. Cereal with starch entirely converted into soluble carbo-hydrates.

Horlick's Food.
Mellin's Food.
Hovis Food. No. 1.

F. Cereal with starch partly converted into soluble carbo-hydrates.

Allenbury. No. 3.
Benger's Food.
Hovis Food. No. 2.
Savory and Moore's Food.

G. Cereal with starch mostly unconverted.

Robinson's Patent Barley.

Ridge's Food.

Neave's Food.

Frame Food.

Chapman's Wheat Flour.

Robinson's Groats.

It will be seen that only those which are entirely free from unconverted starch are really suitable to babies under six months old—Classes A., B. and E. Those in Class A. are not really patent foods, and have been dealt with in the previous chapter. After six months a small amount of starchy food may be cautiously introduced into the child's diet—the foods in Classes C. and F. being suitable. From the ninth to the twenty-fourth month any of the foods in Classes F. and G. may be added to the child's diet with advantage.

Diet after Nine Months. Milk is still the principal article in the child's diet, and must continue to be so for the first two years at least, not less than $1\frac{1}{2}$ pints being given daily. Fruit may be introduced gradually, indeed a little orange or grape juice carefully strained may be given any time after the first week.

Diet for a normal baby. *At the seventh or eighth month.* One feed each day may be thickened with groats or some other patent food. A hard crust may be chewed but not swallowed.

At the ninth month—Broth might sometimes be given at the midday feed instead of milk, and half the yolk of a new-laid egg may occasionally be added to a milk feed. Only four meals a day.

At ten months—Bread and milk, and a little potato soup may be introduced.

At twelve months—Three meals a day should suffice :

Breakfast—Rusk with butter or bacon fat, and milk,
or bread and milk.

Dinner—Broth or gravy thickened with pea flour or potatoes.

Or a little pounded fish or scraped underdone meat, or lightly boiled egg.

Custard pudding, baked apple, mashed prunes or other fruit without skin or pips.

Tea—Same as breakfast. Treacle or jam without stones or pips.

Between twelve and eighteen months the following may be gradually added, keeping to three meals a day. Porridge, dripping, milk and suet puddings, vegetables, stews, lightly cooked meat (in very small quantities), boiled rabbit, grated cheese, raw apple, baked and raw banana.

A very delicate child would probably only be able to take the diet of a child several months younger. Starchy food should be given with great caution in these cases, and even the milk may have to be diluted. Raw scraped meat, meat juice, and cooked fruit are usually well taken, but, of course, any child with a very delicate digestion will be under a doctor's care.

VII.

THE PREMATURE BABY.

It is usually said that the foetus is viable at the twenty-eighth week of growth, but, as a matter of fact, though it may be born alive even earlier than that, it is very rarely capable of maintaining an independent existence before the thirty-second week. In any case, if born before full term it will be delicate and need special care. The greater its intra-uterine age the more vigorous it will be, and the better its chance of surviving. There was an idea among the old "gamps" that an eight-months' child was more delicate than a seven-months' one. This was quite without foundation.

The premature infant may be distinguished from the full-term child by the following signs :

It weighs less than 7 lbs. The average weight at eight months is 5 lbs., and at seven months $3\frac{1}{2}$ lbs., but this is not a very reliable guide, as the deficient weight may be due to other things besides prematurity, and many a poorly nourished full-term child does not weigh more than 5 lbs.

It is less than 20 ins. long. This is a fairly reliable sign. The foetus usually measures in inches half the number of its weeks; thus a thirty-six weeks' foetus measures 18 inches.

The skin is red and shiny. It is also wrinkled owing to the absence of subcutaneous fat. There is less vernix caseosa than at term. There is lanugo, or

soft downy hair, all over the body except on palms and soles.

The nails do not reach to the ends of the fingers.

The head is large in proportion to the trunk, the sutures and fontanelles are wide, and the bones are soft.

The muscles are flabby and lacking in tone.

The temperature is fluctuating, the pulse quick, and the respirations shallow and rapid.

The child sucks and cries feebly.

The bowels and bladder should act as at full term, but meconium is passed for a longer time.

The characteristics and treatment of the premature infant are usually considered under three headings.

1. The low grade of vitality. 2. The difficulty it has in maintaining its body temperature. 3. The difficulty it has in digesting and assimilating its food.

The low grade of vitality is due to immaturity; the nervous system is poorly developed, and many of the organs are unable to perform their functions. General physical and muscular weakness results, and the child is often unable even to suck or to expand its chest in breathing or crying. In addition to this, many premature babies suffer at birth from the effects, direct or indirect, of the maternal illness which brought on the premature labour, such as albuminuria or ante-partum haemorrhage.

The following complications frequently result from poor vitality:

Cyanotic Attacks. The child becomes suddenly blue or ashy grey, and stops breathing. If treated promptly it will generally recover, but unless its condition improves and it can be made to take nourishment well, the attacks will become more frequent, prolonged, and finally fatal.

Atelectasis is common. Sore buttocks and thrush occur very easily. Jaundice is often seen, also conjunctivitis. The child has so little power of resistance that any infection is grave and probably fatal. The greatest care must be exercised with the hot bottles, for

the premature baby's tissue seems to burn with the least heat.

The different complications will be treated by the doctor as they arise. For the cyanotic attacks the immediate treatment is stimulation of one kind or another. Artificial respiration, mustard baths (105° F.), oxygen, brandy 2-5 mins., massage, are all useful. As the attacks are due chiefly to inanition, every effort must be made to improve the child's nutrition.

The Difficulty in Maintaining the Body Temperature is due partly to the low vitality. The nervous centre for regulating the heat of the body is not well developed. Then, too, the surface of the body, by which the child loses heat, is large in proportion to its bulk, and there is an absence of subcutaneous fat. Also the metabolism, or chemical changes which take place in the body during nutrition and create heat, is poor.

The premature baby is therefore practically a cold-blooded animal, and its temperature must be kept up artificially, or it will sink to the level of its surroundings.

The treatment depends upon the size and vitality of the infant. If it is very premature and feeble, incubation is indicated. It is an essential point with incubation that the temperature of the incubator should be steady. A good incubator is self-regulating in this respect, and provides ample ventilation. The doctor will order the temperature at which he wishes the incubator set to begin with (usually 75°-90° F.); then as the child grows stronger, it may be very gradually lowered each day. At first the infant is fed and changed inside the incubator, but after a time, if it does well, it may be taken out once or twice a day in a warm room and given its feed by the fire with a screen round. The length of time for which incubation will be necessary varies; for some babies a few days will be sufficient, while others will not be happy in an ordinary temperature for several weeks.

Some authorities disapprove of incubators altogether. They consider that the ventilation is inadequate, and

that some very slight variation of temperature is stimulating to the child. This, however, depends very much upon its vitality. The alternative treatment is a tent.

In any case, as it is often difficult to procure an incubator at short notice, the nurse must be prepared to improvise one, at least for a time. If it can be arranged, it is better to have the child in a separate room from the mother, as she would find the temperature necessary for the baby very trying. The cot that has been prepared is nearly always too large for the tiny inmate just at first. A small wicker cradle, a box, washing basket, or Japanese travelling basket are more suitable.

To prepare the incubator, the little bed is lined with a small blanket, a hot-water bottle is placed on each side, and another at the foot. These are covered again with blanket, and an inner lining of cotton wool. The baby is then placed comfortably in the centre and covered with more cotton wool and blankets. A small tent is arranged near the fire (a good-sized clothes horse with a sheet pinned round, and another over the top, answers very well), the baby in its little nest stands on a chair in the tent, and a thermometer is hung up inside to regulate the temperature. About 75° – 80° F. is the heat usually required at first, but if the child's temperature is taken per rectum two or three times a day when the napkin is changed, the outside heat can be regulated according to its needs. The child's temperature must be kept as nearly normal as possible; too much heat is nearly as bad as too little, and very exhausting to a little baby.

This elaborate treatment is, of course, only necessary for a very small and feeble infant. For a child over 4 lbs. and fairly strong, cotton wool will hardly be necessary; a cosy corner by the fire, a screen, and hot bottles will probably be quite enough. A vigorous child of over 5 lbs. may often be treated almost like a full-term child.

The Difficulty in Digesting and Assimilating Food is also due to immaturity. The digestive organs are not

well developed, and the ferments are imperfectly secreted.

The child is nearly always too feeble to suck the breast at first ; nor is the mother's secretion available for a few days, and the baby, having no reserve to draw upon, needs feeding from the very beginning. As it is only able to take very small quantities at a time, and needs a large amount of food in proportion to its size, it must be fed frequently.

For the first few hours, about half a drachm of lactose and water (1 in 16), given every hour, will satisfy it ; then a few drops of cream may be added and perhaps a little whey. When the mother's milk comes in it should be drawn off and given to the child in a bottle or with a pipette.

After a few days, if the mother's breasts fail to secrete and all efforts to stimulate them prove useless, wet nursing is sometimes advised. Most often, however, that is not practicable, and the baby must have some easily digested or pre-digested food provided for it. Whey mixtures are usually found to be the most suitable.

At three days old the following might be tried :

Whey, 10 oz. ; cream, 4 drms. ; lactose, 1 oz. Water to make 1 pint of food.

After a time milk may be gradually introduced instead of whey. A drachm to each pint to begin with, and by the end of the first month the child might be taking :

Whey, 7 oz. ; milk, 4 oz. ; cream, 6 drms. ; lactose, 1 oz. Water to make up one pint.

After that the whey may be slowly replaced by milk altogether. The rate at which the strength of the food should be increased is indicated by the child's condition and progress. With a vigorous, hungry infant it may be more rapid, but the least sign of indigestion or intestinal derangement is a warning to return to the weaker food.

If the whey mixture does not suit, fully peptonized,

diluted milk might be tried ; failing that, one of the good sweetened brands of condensed milk, diluted 1 in 20 to 1 in 12, is often successful for a time with these tiny babies. It must not be forgotten that no condensed or peptonized food is really suitable for prolonged use, and that the little patient should be educated to take modified cow's milk as soon as possible.

With regard to the quantity of food taken, it depends very much upon the size of the child.

An infant weighing from 3 to $3\frac{1}{2}$ lbs. would need :

The 1st day, 2 oz., or about 40 mins. every hour.

The 3rd day, 5 oz., or about 2 drms. every hour and a half.

The 7th day, 8 oz., or about 5 drms. every two hours.

By the tenth day the infant needs, according to Professor Budin, rather more than one-fifth its body weight in twenty-four hours. Thus, at the tenth day an infant weighing

$2\frac{1}{2}$ lbs. takes 8 oz. or $3\frac{1}{2}$ drms. every hour and a half.

3 lbs. takes 10 oz. or $6\frac{1}{2}$ drms. every two hours.

4 lbs. takes 13 oz. or $8\frac{1}{2}$ drms. every two hours.

5 lbs. takes 16 oz. or $10\frac{1}{2}$ drms. every two hours.

Regularity of feeding is important with these little babies, but sips of water (boiled) may be given between the feeds if the child is thirsty. A tiny bottle with a small teat, suitable for premature babies, may be bought of Messrs. Bailey, Oxford Street. (See Fig. 3.)

General Treatment. At birth the babe should be received in a warm sheet of cotton wool, and placed immediately in a basket close to the fire with well protected hot-water bottles. Not for one moment from the time of its birth must a premature baby be allowed to chill.

During its toilet it must be exposed as little as possible. The eyes must receive the usual scrupulous attention, both at birth and after. The child will not be bathed,

but the face and hands will be gently washed ; then the cord must be dressed, and the body must be oiled carefully and quickly all over with warm olive oil. If the vitality is fairly good it may be dressed in some warm woolly garments and a flannel binder ; if, however, the child appears to be very feeble, it is better to just wrap it in cotton wool and leave it quietly in its warm cot. In any case, it should have one layer of cotton wool next to the skin, covering even the hands and feet ; and any garments it may wear must fasten down the front, so that the child may be quickly lifted out of its clothes into a hot bath if necessary. A pad of cotton wool placed under the buttocks to receive the excretions can be changed from time to time without disturbing the child.

It must be moved and handled as little as possible, but the oiling process may be repeated daily, with gentle massage of the limbs, if the little thing seems able to bear it. This improves the tone of the muscles. Cod-liver oil is sometimes used instead of olive oil for this purpose.

Most of these little babies need some stimulant ; the best French brandy, or a good old sherry, are suitable. The dose usually given is two drops every two hours. This is, of course, given under the doctor's direction. Such small doses should not be too much diluted ; if ordered to be given with the food, the child should have it in a small quantity at the beginning of each feed, not in the whole bottle.

In conclusion, the chief necessities of these little babies are warmth, regularity, an easily digested and sufficient diet, and the most scrupulous cleanliness. The intestinal canal must be kept in healthy condition, the weight and temperature must be carefully watched. Frail little creatures with a most uncertain hold on life, they demand a tender and unremitting devotion. If they gain steadily, sleep and take food well, pass normal stools, and maintain a good colour and temperature, one may feel that they are doing well, and hope to treat them almost as normal babies at the end of about six weeks.

VIII.

THE ABNORMAL BABY.

CONGENITAL DEFECTS AND BIRTH INJURIES.

Asphyxia Neonatorum. The word "asphyxia," which originally meant "pulseless," is now used to indicate a condition of suspension of the respiratory function. This condition at birth may be due to :

1. Interruption of the placental circulation during labour, caused by premature separation of placenta or pressure on the placenta or cord.
2. Premature inspiration in utero, which is caused by interruption of placental circulation ; or in a breech labour, by delay in the after-coming head, and cutaneous stimulation before the head is born.
3. Head injuries.
4. Congenital defects of lung or brain.
5. Poor vitality. Prematurity.

Asphyxia is of two kinds, blue or white.

With *blue asphyxia* the child is suffocated and cyanosed. There is slight rigidity of the muscles, the eyes are open, the heart usually beats fairly well but may be feeble, the cord pulsates. The condition generally clears up quickly, but may change to the more severe type, white asphyxia, if not promptly treated.

Treatment. Clear out air passages, remove mucus with soft rag round little finger, or by suction through

catheter ; gently rub spine ; apply heat and cold alternately ; warm bath ; artificial respiration.

With *white asphyxia* the child is collapsed, skin blanched, muscles toneless, sphincters relaxed, eyes closed, cord pulseless, heart beats very feeble, all reflexes absent.

Treatment. Separate cord, clear out air passages, start artificial respiration at once and continue as long as the heart beats, or until natural respiration is established. Hot flannels may be applied or a warm bath given (104° F.), at the same time as artificial respiration. Gentle insufflation through a handkerchief placed over the child's mouth is sometimes successful. Very delicate and gentle treatment is necessary for this condition.

Ascites. An accumulation of fluid in the peritoneal cavity. The child is sometimes born with this when the mother is unhealthy.

Atelectasis Pulmonum. Imperfect expansion of the lungs. The child is cyanosed (blue) and the respirations are shallow. If the infant can be made to cry lustily the condition will probably be relieved. Artificial respiration at intervals sometimes helps, and hot mustard baths may stimulate the respiratory centre. The child may recover as it gets stronger, or it may die suddenly.

Caput Succedaneum. A doughy swelling that appears on the presenting part of the head at birth. It is caused by an exudation of serum into the tissues of the scalp just under the skin, due to pressure on the surrounding parts during labour. It disappears within a few hours or days. No treatment is necessary.

Cephalhaematoma. A fluid swelling that appears on the head at birth, or a few days later. It is due to the same causes as caput succedaneum. It is an effusion of blood between the bone and membrane covering the bone (pericranium). This membrane is tightly attached to the sutures. The swelling is limited by the size of the bone, never crossing a suture. It grows larger for

the first few days and takes several weeks to disappear. No treatment is necessary, except in the rare event of suppuration.

Encephalocele or Meningocele. A swelling on the head caused by a protrusion of the brain membranes, containing cerebro-spinal fluid, or part of the brain tissue. It is always situated over a suture or fontanelle, usually the posterior fontanelle.

Facial Paralysis. Paralysis produced by pressure of the blades of the forceps on the nerves of the face. It usually affects one side of the face only. It generally clears up in a very short time. If severe the child may have difficulty in sucking and swallowing. If the eye remains persistently open it must be guarded with a shield. Bad cases are sometimes complicated by convulsions and meningitis.

Hare Lip and Cleft Palate. Hare lip is a slit in the upper lip, usually reaching up to the nostril. It is sometimes double, a slit on each side. The treatment is operative, at about six months usually, though some surgeons operate much earlier. Hare lip is often associated with cleft palate, an opening in the roof of the mouth communicating with the nasal cavity. The operation for cleft palate is usually done at two or three years.

These babies are very difficult to feed ; sometimes they can suck with a special teat, or they may have to be fed with a spoon or pipette.

Hydrocephalus. Water on the brain. The head is abnormally large, the sutures and fontanelles wider than usual. The child may be born with it, or the condition may develop after birth. The general nutrition is usually poor, and the brain is almost always affected.

Hypospadias. Malformation of penis. The orifice of the urethra is underneath the glands.

Hermaphroditism. Having generative organs with characteristics of both male and female—neither sex being fully developed.

Heart Disease (congenital). Due to the non-closure of the foramen ovale (the foetal opening between the right and left auricles) at birth. The child is feeble, blue and cold; temperature is subnormal. The condition persists after the breathing is established. Most babies die quite young, some live for several years, though they seldom reach adult life.

Imperforate Urethra. The canal leading from the bladder is closed. Sometimes the child is unable to pass urine because the prepuce or labium is plugged up with vernix caseosa; gentle washing with warm olive oil will cure this. If it does not, the doctor must be informed. A small catheter, No. 1 or 2, or a probe, will be required. Circumcision may be necessary.

Imperforate Rectum or Anus. This is due to arrested development. In the early embryonic days the rectum does not communicate with the body surface, and it may fail to do so as the embryo develops. The obstruction may be at the anus, or an inch or more up the passage. Immediate operation is necessary.

Naevus. A congenital blemish of the skin, commonly known as "Mother's Mark." It is usually due to dilatation of the small blood-vessels. It may involve the cutaneous tissue, or the skin only. If on an unexposed part and not increasing in size, no treatment is necessary. Bad ones are removed by operative treatment, smaller ones by application of acids, hot needle, electricity. The small patches often seen on the eyelids and root of nose in new-born infants are not true naevi. They usually disappear rapidly.

Microcephalus. A congenital malformation of the head. The vault is small; the sutures and fontanelles close very early. The child is mentally deficient.

Phimosis. The orifice of the prepuce is small; the foreskin is tight, and cannot be drawn back. The child has difficulty and pain on passing urine.

The foreskin should be drawn back and the parts cleaned every day. If the nurse is unable to do this

easily, she should consult the doctor. Circumcision will probably be necessary.

Spina Bifida. Malformation of the spine due to arrested development. There is a space between the vertebrae, usually in the lumbar or sacral region; a sac-like tumour often protrudes through the cleft; it contains cerebro-spinal fluid, and may have a very thin or a fairly thick covering of skin. The prognosis is more favourable when the covering is thick; in any case it is grave, the child usually dies of meningitis or escape of the fluid. The condition is often associated with talipes, and paralysis of the lower limbs.

Talipes. Club foot. The foot is bent up on the leg, and is extended with difficulty. It is due to the contraction of certain muscles. Mild cases yield to massage, but they need patient and persistent treatment. More severe cases may need operative treatment. When the foot turns inwards it is called *Talipes Varus*. This is the most common type. When turned outwards it is called *Talipes Valgus*.

Tongue Tie. The *fraenum linguae*, or small membranous attachment under the tongue, is too short or comes too far forward. When the tongue is protruded there is a notch in the middle. The child has difficulty in sucking. Severe cases are said to be rare, but a slight degree is not uncommon.

Umbilical Hernia is of Various Degrees and Kinds. A small loop of the intestines may project into the cord. This is not very serious, and usually reduces itself naturally soon after the separation of the cord. A firm soft pad should be placed under the binder.

Occasionally the greater part of the abdominal contents protrude through an enlarged umbilical orifice; this trouble, which is due to defective embryonic development, starts in those early weeks when the ventral walls should close in over the abdominal organs, but fail to do so. Immediate operation is necessary, and if the hernia is not very large, it will probably be successful.

Sometimes a small pink tumour covered with mucous membrane is found to protrude at the umbilicus after the separation of the cord. This is caused by prolapse of the omphalo-mesenteric duct, or the duct which originally connected the umbilical vesicle with the embryonic intestines, and which should normally disappear before full term. Rarely there is a fistula in the tumour, through which faecal discharge escapes. Slight cases clear up spontaneously, cleanliness being the only treatment necessary. More severe cases require a small operation.

IX.

BABY AILMENTS.

Breasts. The breast of new-born babies, boys as well as girls, often become hard and swollen during the first week. They sometimes secrete a little clear fluid. The chief thing is to protect them from pressure, a covering of cotton wool and loose clothing will do this. No other treatment is necessary, and they must on no account be rubbed; any undue interference may result in suppuration. If the breast is inflamed, hot fomentations may be applied, and the doctor must be informed.

Ophthalmia Neonatorum, or Acute Purulent Conjunctivitis. Inflammation of the conjunctiva or mucous membrane which lines the eyelids and covers the eyeball. It is usually due to infection from a vaginal discharge, either during the passage of the head through the vagina or immediately after birth. The first symptoms appear about two days after birth, or infection. The eyelids are swollen and inflamed; there is a discharge, first watery, then purulent, which is extremely infectious. Unless the disease is treated and checked in good time, the child may lose its sight. In bad cases, ulcers form on the cornea and result in perforation.

The treatment is, first to prevent infection taking place, by wiping the eyelids with aseptic swabs directly the head is born and before the eyes open; and afterwards to wash out the eyes with boracic lotion night and morning.

If infection occurs, the usual treatment is frequent irrigation with warm aseptic lotion (boracic), and the instillation of some antiseptic, as ordered by the doctor, once or twice a day. Nitrate of silver, 1 per cent., or protargol, 10 per cent., are commonly used. Every antiseptic precaution must be taken to prevent the infection spreading.

When only one eye is affected great care must be taken to guard the sound eye. The child must lie on the same side as the infected eye to prevent the discharge running into the other one. If breast fed, a good-sized piece of lint should be placed over the breast with a hole for the nipple to come through, in order to protect the breast from the discharge. The eyes will, of course, always be cleaned before the feed. The arms must be fastened down or kept inside the gown.

If the mother has a history of a vaginal discharge, it should be reported to the doctor before the birth of the child. Nurse must always report any inflammation of the child's eye, however slight. Infection may occur any time during the puerperium; the most likely source after labour is a dirty hand. The mother's hands should always be washed before she is given the baby.

Thrush. Little white spots, something like milk curds, appear on the tongue and roof of the mouth; when wiped off there is a raw patch left underneath. It is due to the growth of a fungus called the *Oidium Albicans*. The condition is usually the result of want of cleanliness. The mouth should be gently cleaned with a *soft* rag and sterile water at least twice a day. Unskilful manipulation will favour infection by roughening the mucous membrane. If infection occurs, cleanliness, applications of glycerine and borax, a dose of castor oil (half a drachm), and corrected diet if necessary, will usually clear it up.

Jaundice or Icterus Neonatorum. A yellow discoloration of the skin during the first week of life. The cause is not known, but it is probably partly due to the sudden changes in the circulation at birth. It is said

to occur more frequently when the cord is separated very early ; it is certainly more common with premature and delicate infants. The child is not ill, and no treatment is necessary. The motions are normal in colour ; the urine is not dark.

True Jaundice is a rare and very serious disease in young babies. The child is very ill, the stools are colourless, the urine is pigmented. It may arise from malformation of the bile ducts, or may be, and more usually is, the result of septic infection of the cord. It is sometimes of syphilitic origin. It is nearly always fatal.

Infection of the Umbilicus. This may take place either before or after the separation of the cord. It may be local, when it is usually slight. The local infection may become general ; or the poison may enter by the umbilicus and carry infection to remote organs. Severe septic infection is seen in several forms, which may be distinct or combined. The chief varieties are : inflammation of the tissue round the umbilicus, known as omphalitis ; inflammation of the umbilical veins and arteries ; septicaemia ; pyaemia ; erysipelas. The general symptoms of septic infection are : rise of temperature, feeble pulse, diarrhoea, vomiting, jaundice, and abdominal distension. All cases are grave, and most are fatal. The source of infection is usually want of surgical cleanliness in the attendant's hands, or the scissors, ligatures, dressings, etc.

Another rare but grave infection contracted through the umbilicus is Tetanus, or Lockjaw. It is due to the absorption of a poison produced by the tetanus bacillus. The disease is characterized by spasmodic muscular contractions. It is the most fatal of all infantile diseases. Antitoxin treatment is hopeful if it can be employed in time, but the action of the poison is rapid.

The prophylactic treatment is asepsis in handling and dressing the cord. Fuller's earth is thought by some authorities to be an occasional source of infection.

Constipation is more common after the first month, and with bottle-fed babies. The chief causes are : want of training, reaction from over-stimulation (castor oil, suppositories, or diarrhoea), diet lacking fat, insufficient food, insufficient fluid, muscular weakness, general debility.

The cause must be treated. Habit is of the first importance. Drugs and suppositories should only be given with the doctor's permission, when it is urgently necessary to secure an action. The diet must be corrected, extra fat may be given if necessary in the form of cream, olive oil, or cod-liver oil. Malt and cod-liver oil suits some babies (about 10 mins. three times a day). Sometimes *one* feed a day of Mellin's Food will help. After the first fortnight a teaspoonful of orange juice, grape juice, or prune juice well strained, may be given once a day. Massage of the abdomen is very useful, and should be practised regularly after the cord is off. The child's general health must be improved with fresh air, exercise, cool baths, and suitable diet.

Indigestion, Colic, Flatulence. Caused by improper food or feeding, too rich, or too much food, taken too quickly or irregularly. In breast-fed babies the mother's diet may be at fault. The cause must be treated. Hot applications to the abdomen, hot baths, or massage may relieve the pain. If the child is held up with slight pressure on the stomach it will often bring up the wind. The doctor will treat severe and repeated attacks.

Abnormal Stools. Green stools, if the infant is otherwise well, happy, and gaining weight, are not very serious, and are better not treated. If the green stools are watery and curdy they are due to indigestion—the causes of which, see above. Correct diet, give soda-citrate and soda-bicarbonate if indicated.

Offensive stools, pale or green, are due to decomposition in the intestines, probably caused by excess of proteid or fat (if pale), bad milk or dirty bottles. May be due to disease or debility. Excess of mucus or copious watery

stools indicate serious intestinal derangement, and must be treated by the doctor.

Melaena Neonatorum. Discharge of blood in the stools. A small quantity of blood is sometimes swallowed at birth, and may be passed in the stools. True melaena consists of a profuse discharge of blood from the rectum, or occasionally vomited from the stomach soon after birth. The cause is unknown. It is a serious condition, and frequently fatal. There is rapid loss of strength, extreme pallor, subnormal temperature. External heat may be applied, the child wrapped in cotton wool, and a modified fluid diet given, with the doctor's permission.

Vomiting is a symptom of gastric disorder. The stomach often acts as a safety valve and rejects superfluous or unsuitable food. Vomiting immediately after a feed is due to having taken too much, or too quickly; or possibly to pressure on the stomach (a tight binder). This vomiting will become a habit unless it is checked. The child must be kept very quiet after a feed; the amount taken must be regulated (by test feeds if it is a breast-fed baby). If bottle fed, a teat with a small hole must be used. If the whole feed is vomited with flatulence, it may be repeated slowly after a few minutes' interval. The food may be too rich in fat.

Vomiting from fifteen minutes to one hour after feeding indicates that either the food is wrong, or the stomach out of order. If the vomit is sour, decomposition is taking place.

The vomiting of large quantities of clear fluid sometime after feeding indicates general nervous and physical debility.

Pyloric stenosis, or contraction of the opening between the stomach and intestines, is an occasional cause of persistent vomiting. Serious cases must be treated by the doctor.

Diarrhoea. With breast-fed babies diarrhoea is usually due to the feeding; too large, too frequent, or irregular feeds. With bottle-fed babies, it is usually

the food ; impure milk, stale milk, starchy food, too rich food, want of cleanliness. A dose of castor oil may be given to clear away the irritating matter from the intestines ; the diet and manner of feeding must be corrected. If the bowels then do not resume their normal healthy action a doctor must be consulted.

Summer Diarrhoea, or acute gastro-enteritis. This disease is most common in the hot weather between June and September. Its occurrence is favoured by a debilitated condition in the child resulting from bad feeding, unhealthy surroundings, chills, rickets, etc. It is due to the action of micro-organisms which are probably introduced in the food ; these multiply in the stomach and intestines, causing irritation and damage to the intestinal mucous membrane, and manufacturing poisons which are absorbed.

The symptoms are acute and develop rapidly ; in severe cases the child may be dead in twenty-four or forty-eight hours from the onset of the disease. The characteristic symptoms are : vomiting ; purging, with stools first watery, then loose, with greenish matter, or like rice water, and later on mucus with blood, very offensive ; restlessness and thirst ; high temperature ; feeble pulse. As the disease progresses the child has a pinched, shrunken appearance, the skin is of a dirty earthy colour, the fontanelle depressed, the body is cold, and the child sinks into a state of coma with extremely subnormal temperature ; occasionally there are convulsions. Chronic colitis, atrophy, and many other complications may follow.

The treatment aims at clearing away the poisons ; resting the damaged intestine ; withholding any food which provides a suitable medium for the development of germs ; supplying fluid to dilute the poison and relieve the thirst ; soothing the nervous system and counteracting collapse.

The doctor treats the various symptoms as they arise. Purges, intestinal irrigation, stomach wash, subcutaneous

injections of normal saline fluid, stimulants, small quantities of water by mouth, hot baths 100° to 106° F., hot packs, and open air with hot water bottles. For about twenty-four hours, no food at all is given, only sterile water; then weak albumin water, sherry whey or rennet whey diluted, and meat juice. Brandy is usually prescribed. After a time the diet may be very cautiously increased, beginning with small quantities of peptonized milk, and gradually returning to the normal diet if there is no return of the bad symptoms.

After an attack of summer diarrhoea the child should, if possible, have a change of air to the country or sea. He will need great care for a long time. It must not be forgotten that this disease is infectious to other babies; all napkins should be boiled or burnt.

Syphilis. The symptoms of congenital syphilis usually appear some time between the second and the sixth week; occasionally the child is born with them, but more often it is fairly healthy in appearance at birth, though it may have a suspicious inclination to snuffles.

The characteristic rash consists of bright red shiny patches round the anus or on the palms and soles. These desquamate (peel) after a few days, and leave a dull brown discoloration. In bad cases there are fissures round the mouth, nose, and anus; the mucous membrane of the nose and throat is affected. There is a copious nasal discharge, with the characteristic hoarse cry and snuffles. The general appearance is old and drawn, the skin is wrinkled and of a grey earthy colour, the temperature is subnormal; later there is tenderness of the limbs with swelling at the ends of the long bones, and sometimes paralysis of one or more limbs. Fretfulness, inability to digest and assimilate food, wasting, and skin eruptions are common.

These babies are extremely difficult to feed and rear. They must not, of course, be given to a wet nurse, as the disease is infectious. It is said, however, that the mother, having become inoculated by the bearing of a

syphilitic child, may nurse it with impunity. This is known as "Colles' Law."

Mercury in some form or another is usually given for at least a year. The grey powder is a favourite form, or inunction (rubbing the skin with a medicated ointment) is another method often adopted. (See Pemphigus.)

Sore Buttocks. These may be due to general debility, acid stools, want of cleanliness, or to napkins washed with soda. The cause must be treated. The sore buttocks must be cleansed with boracic lotion or olive oil; soap must on no account be used. Some soothing ointment or lotion should then be applied. Zinc ointment, or zinc ointment and castor oil equal parts, or calamine lotion are useful.

Haemorrhage from the Umbilicus. The haemorrhage that occurs the first few hours after birth is due to careless ligation, or to rapid shrinking of the cord. If the child is carefully watched such haemorrhage will be detected and checked before it becomes serious. The treatment is to re-ligature the cord.

Slight haemorrhage may also be produced by rough handling, or carelessly adjusted dressings at the time of separation of the cord.

The severe haemorrhage which occurs spontaneously between the third and tenth day is much more serious. It may come from the end of the cord or from the umbilicus, and may appear before or after the separation of the cord. The prognosis in such cases is not very good, for the haemorrhage is difficult to control and may recur at intervals for several days. The child's condition is usually bad, as it is probably suffering from either sepsis or syphilis.

The nurse must take a fold of the abdominal wall on each side and pinch the navel well in with it, in that way keeping the haemorrhage controlled until the doctor comes. The usual treatment by the doctor is to underpin the navel with harelip pins or long needles and apply a figure of eight ligature over them.

Rashes must be carefully observed by the nurse and reported to the doctor. The skin affections from which a baby may suffer are many and varied. It requires great experience and knowledge to diagnose them.

Those in the group known variously as Miliaria, Sudamina, Strophulus, and Red Gum are common. They are the result of obstruction of the sweat glands followed by perspiration, caused by too much or too heavy clothing or sometimes indigestion. Red spots appear first, and are usually followed by tiny vesicles or pustules, with or without inflammation. A dose of castor oil, modified diet, and lighter clothing usually clear up the condition quickly.

Scabies. An infectious disease due to the burrowing of a parasitic insect in the skin. It is only seen under conditions of dirt and neglect. Papules, vesicles, and pustules appear. Care must be taken not to let the disease spread; all dressings must be burnt, and clothing burnt or disinfected. The treatment usually ordered by the doctor consists of repeated soap and water baths, followed by the application of special ointment.

Simple Pemphigus. Large blebs or blisters appear on the chest and abdomen; the contents are clear at first, but may become pustular. They rupture after a few days, and leave a red patch which clears up without a scar. The rash is infectious, but the child's general health is not affected, and there is no temperature.

Malignant or Syphilitic Pemphigus. In this form the blebs contain pus or serum, sometimes tinged with blood. They often run together, forming large blisters of 2 inches or more in diameter. They first appear on the soles and palms, or face and scalp, but soon spread all over the body. The child is very ill, and may have a high temperature. The disease is occasionally well developed at birth, in which case it is probably of syphilitic origin. It is always highly infectious, and the utmost precautions must be taken to prevent it spreading.

Eczema. This disease is not contagious. It may

follow other skin affections, being the result of scratching an irritated surface. It is sometimes inherited, or it may be due to general debility, rickets, constipation, indigestion, etc. Any irritation of the skin, such as dirt, friction, or cold winds, may start an attack.

The eruption consists of a moist red surface covered with crusts of dried discharge. It is extremely irritating, and the child must by some means be prevented from scratching himself; it will probably be necessary to tie the arms down and put them in light cardboard splints.

The first point in the treatment of the rash is to remove the crusts. This is done by means of compresses of oil or lotion, as may be ordered by the doctor; ointment is then usually applied spread on lint and covered by wool and bandages. At later stage a soothing anti-septic dusting powder is useful.

The child's general health and diet need attention. Starch foods are particularly to be avoided. Baths must be given only under the doctor's direction. Tonics, cod-liver oil, and malt are often prescribed. A change of air is good, but the sea is not beneficial to these cases.

Rickets. This disease is very seldom seen by the maternity nurse, for the symptoms do not make their appearance during the first few months of life. It is, however, chiefly the result of improper feeding from birth onwards, and every nurse should know something about it.

The causes are: bad feeding, which results in the digestive organs doing poor work, the wrong kind of tissue being formed, and the bones growing in an abnormal manner; unhealthy surroundings; deficiency of fresh air and sunlight; want of cleanliness.

The early signs are: offensive clay-coloured stools, restlessness at night, with sweating of the head; "colds" in the nose and throat; distension of the abdomen. Later on other symptoms show themselves. The child does not grow and develop well; he is fat but flabby; his muscles are weak and wanting in tone. The anterior

fontanelle does not close as it should at eighteen months. The long bones are bent and enlarged at the ends. Little knobs appear on the front of the ribs near the breast bone. The child is in a serious condition, for though rickets itself is seldom fatal, it opens the door to every other kind of sickness, and unless it is cured the child will never grow up strong and well.

The treatment is almost entirely hygienic, *i.e.* corrected diet, no starch and not too much sugar, plenty of fat (cream, butter, margarine, dripping, according to age), plenty of fresh air and sunshine, out of door life, massage, regular daily action of the bowels, and daily baths with cold douches given as follows: the child stands in a warm bath, temperature, 85° to 90° F., and has a gentle stream of cold water poured over his back and chest, the temperature of this douche should be 65° to 70° F. for the first two or three years, and then it may gradually be reduced to 50° F. He is then rubbed vigorously to secure a healthy reaction of the skin. These douches must not be continued, or must be given less cool if the child appears blue or chilled after them.

Malt and cod-liver oil, phosphorus, and iron are among remedies prescribed, as well as Sanatogen and raw meat juice. The child may lose weight under treatment at first, but that is no disadvantage; if convulsions and other serious complications are to be avoided, his organs must be in a more healthy condition and be taught to work properly.

Scurvy. This is another disease of general nutrition. It resembles rickets in that the results are not seen until after many months of wrong feeding. Contrary to rickets, it is generally a disease of the well-to-do rather than the poor. It arises from the prolonged use of sterilized milk or patent foods; that is, of a food lacking in anti-scorbutic properties or vitamins. It often accompanies rickets.

The child is fretful and pale, but he looks fairly

well and gains weight. He dislikes being touched, does not move much, cries a good deal. Haemorrhagic (blue black) spots may appear on the limbs, and later on there may be painful swellings on the bones. After teething time the gums become spongy and ulcerated. As a rule there is no rise of temperature.

The disease usually responds well to treatment, but if it is neglected the bad symptoms will increase, and the child may die of wasting or debility.

The treatment is to stop all patent and sterilized foods, to give plenty of fresh food, uncooked milk, cream, meat juice, raw fruit juice. After the tenth month potatoes and potato soup are excellent anti-scorbutics (see p. 48).

Atrophy, Wasting, Marasmus. This is generally seen during the first six months of life. In true atrophy there is apparently no cause for the disease. The child has poor vitality, it is unable to digest and assimilate its food, and it steadily loses weight.

But atrophy may be, and very often is, secondary to some other disease or condition which interferes with nutrition, such as rickets, syphilis, tuberculosis, cleft palate, or malformation of any part of the alimentary canal. The characteristic of atrophy is failure to grow and develop. The characteristic of rickets is wrong growth and abnormal development.

The treatment of atrophy is very like that of a premature infant. These babies are too feeble to respond to bracing measures until they are well on the road to improvement. They are very difficult to feed, and may not even be able to manage breast milk. It is very often found that they cannot assimilate much fat, though they take proteid and sugar better than would be expected. For this reason sweetened condensed milk may in these exceptional cases sometimes be of great value for a short time. Sanatogen, raw meat juice, and albumin water are also useful, and sometimes diluted fully peptonized milk will agree. The digestive organs must, of course, be trained as soon as possible to deal with breast milk

or modified cow's milk. The most encouraging sign in these cases is a slight steady increase of weight.

Convulsions. These are due to some derangement of the nervous system. Conditions which in an adult would produce a rigor, would in an infant cause convulsions.

Children may be predisposed to the attacks by inherited nervousness, by diseases such as rickets or syphilis, or by the instability and rapid development of the nervous system.

The convulsions may be actually brought on by any brain trouble, such as birth injury, meningitis, haemorrhage, etc.; by sudden rise of temperature, general poisoning of the system from intestinal derangement or indigestion, or by irritation from constipation, diarrhoea, burns, worms, etc. Teething is a very common cause with delicate or rachitic children.

Treatment. The child should be placed in a hot bath (103° F.), with cold applications to the head. If it is pale or very blue, 1-2 oz. of mustard may be added to the bath according to the size. If the bath is not available, a mustard pack may be given instead. Dip a large towel in a quart of hot water and 4 drms. of mustard, wring it out and roll the child in it with blankets over; after 10 mins. remove the pack and wrap the child on hot dry blankets. When the attack is over a dose of castor oil may be given. The doctor must, of course, always be sent for, and he will treat the cause of the attack.

The after treatment by the nurse is to keep the child warm and quiet, with the head cool; avoid irritation and risk of chill, attend to the diet, and keep the bowels open.

Teething. Logically, teething ought to have been treated under the heading of the normal baby, for it is a natural process which in a healthy child should be accomplished without any disturbance, except perhaps a slight temporary irritation of the gums when the teeth

are actually being cut. Unfortunately, however, very few, even among the well-managed babies, are in such splendid nervous and physical condition that they will not be a little upset by their first teeth.

The ideal infant will have an increased salivary secretion which makes him dribble, and he will want to seize everything he can get hold of to put in his mouth; he may even be a little fractious and wakeful at night. But a nice hard crust to suck or a warm bath will usually settle him.

In spite of theories to the contrary, many babies do suffer from little attacks of fever, diarrhoea, and nervous ailments at this time; probably because they are not in absolutely fit condition before the teething begins. It must be remembered that the mouth is part of the alimentary canal, and if the stomach or intestines are allowed to get out of order from constipation, indigestion, and improper feeding, the mouth and gums will share the general irritation, and teething will become a painful and serious process.

If the diet is scrupulously attended to, the mouth kept clean, the bowels regularly opened, and the slightest intestinal derangement attended to at once, there should be very little trouble about the cutting of the teeth.

The normal child cuts his first teeth between six and seven months. The set of twenty is complete early in the third year. Delay is usually due to rickets, unless the child is small and generally backward from some other cause, such as prematurity or twin birth. The order in which the teeth appear is as follows:

From the 6th to the 9th month. 2 lower single teeth.

From the 8th to the 11th month. 2 upper single teeth.

From the 10th to the 14th month. 4 lateral single teeth, upper and lower.

From the 12th to the 15th month.	2 lower double teeth, front. 2 upper double teeth, front.
From the 18th to the 24th month.	2 lower canine or eye teeth. 2 upper canine or eye teeth.
From the 24th to the 30th month.	2 lower double teeth, back. 2 upper double teeth, back.

The second set of teeth begins during the sixth or seventh year. There are thirty-two in all; twenty-eight are complete by the fifteenth or seventeenth year. The last four, or wisdom teeth, appear several years later, usually between the twenty-third and twenty-fifth years.

Vaccination. Vaccination is a prophylactic measure to protect the child against infection from smallpox. Every child should be vaccinated, and it is the nurse's duty to explain the necessity to any wavering parents who may consult her on the subject. It has been proved by the most exhaustive statistics that vaccination does confer complete immunity from smallpox for several years, and probably to a slight degree throughout life, though it is safer to have the operation repeated at about ten years of age, and always if smallpox becomes prevalent more than seven years after the last vaccination. The English law at present enacts that all babies be vaccinated before they are six months old. If the parents conscientiously object, they may be exempted by obtaining a certificate to that effect before the fourth month. The certificates will be granted by a magistrate or by two justices. Before the fourth month the public vaccinator will call and perform the operation if invited. He may call uninvited after the fourth month. A doctor's certificate can easily be obtained if the state of the child's health renders postponement advisable.

The child should not be vaccinated if it is unwell from any cause, if its skin is not in healthy condition, if it has been exposed to, or recently recovered from an infectious disease. The doctor is the best judge as to

the child's fitness for the operation. It is usually performed during the first few months, if possible before teething begins.

The longer it is postponed, the more troublesome it is likely to be. Some doctors like to do it about the fifth week, in which case the monthly nurse generally stays on an extra week or two so that she may leave the baby quite convalescent.

Skilfully and aseptically performed, as it is nowadays, vaccination should be very little trouble either to the baby or the nurse. The skin must be thoroughly cleansed before the operation; an aseptic dressing must be applied afterwards and kept in place with a bandage; the arm must be carefully protected from rubbing when the blisters appear. If the vaccination is successful and runs a normal course, a small red pimple will appear on the third day at each insertion; on the fifth day it turns to a watery blister, enlarges, and becomes red and tender; on the tenth day bursts and discharges, and all inflammation should be over. The scab falls off about the twentieth day.

If there is excessive inflammation, boracic powder may be applied, or the doctor may order boracic fomentations. No poultices should be used. The bowels should be kept well open; it is advisable to give a dose of castor oil on the third day if the bowels have not been well opened.

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